

Finding “Local Identity” through Mass Customized Architecture on Jeju Island, Korea

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by

Haesung Park

DArch Committee

Stephen Meder, Chairperson

William Chapman

Edward J. Shultz

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Abstract

Jeju Island, also known as the “Hawai‘i of Korea” is the most popular holiday destination in Korea and an ideal place to live for both Koreans and foreigners. However, like much of developing world, it is evident that Jeju has lost much of its heritage to international styles and globalism. In particular, the cultural association embedded in built forms has virtually vanished with the demolition of traditional houses, *Chojip*, while new construction has created a large number of hotels, resorts, museums, and apartments. Despite the fact that the local government and architects have put much effort into applying local materials and have attempted to reflect Jeju’s natural environment in building designs to increase regional uniqueness, Jeju architecture has been heavily criticized as architectural ornamentation. The current study, therefore, suggests a way to revitalize Jeju’s local identity through architecture that is creative and functional while reflecting cultural values and a sound understanding of the local environment. The final design of the thesis called “Jeju House” is designed to fulfill this purpose. Jeju House accommodates the essences of the traditional Jeju domicile, *Chojip*. It delivers an architectural, philosophical, environmental and cultural concept of *Chojip*. Also, innovative use of materials and technology is incorporated into the building with regional uniqueness and traditional wisdom of how to survive in the harsh local environment. Moreover, Jeju House can be personalized based on Jeju local residential needs through the implementation of mass customization. The mass customization of Jeju House should increase its affordability, which will allow it to be distributed widely on Jeju in various design forms.

FINDING “LOCAL IDENTITY” THROUGH MASS-CUSTOMIZED ARCHITECTURE ON JEJU ISLAND, KOREA

A businessman invited me to plan a large tourist complex... I answered that I would accept the commission on one condition that I spend two months prior to doing so living in the region to learn the climate characteristics, the quality of workmanship of the place, in short, the “local color” ... I told him it was necessary for me to spend some time over there, since it was essential to really get to know the people, materials and building processes, local resources, anything that was part of the very interesting and specific lifestyle of the region...I do not believe in a universal architecture. Most architects prefer to stop thinking, creating, and enter into a much easier and safer modality in which there are no risks, no danger of error.¹

Introduction

Jeju Island, also known as the “Hawai‘i of Korea”, was once a place of exile during the Korean Joseon Dynasty (1392-1910) and suffered from a harsh environment that left islanders in poverty and isolation. However, with the advancement of transportation and communications, Jeju has become the most popular holiday destination in Korea and an ideal place to live for both Koreans and foreigners. However, in order to accommodate the increasing number of tourists and population from the mainland, Jeju Island is in the process of building a large number of hotels, resorts, museums, and apartments. In contrast, almost all of the traditional houses called *Chojip* have been demolished leaving only five original Chojips on the entire island.

Moreover, while Jeju has achieved rapid economic growth because of an increase in tourism, a loss of much cultural identity has also occurred. The new generation of

¹ Tzonis Alexander, et al., Tropical Architecture: Critical Regionalism in the Age of Globalization, (Academy Press, 2001), 106-107.

islanders no longer speaks their native regional dialect and prefers to live in modern apartments separated from their extended family. As a result, the transmission of local knowledge and language has been disrupted and there has been a significant deterioration in culture and belief systems. Similarly, the cultural association embedded in built forms has virtually vanished with the demolition of traditional houses.

Despite the fact that the local government has been partially responsible for the loss of cultural identity, they have come to realize the importance of having regionally unique built forms to promote tourism. The discussion on developing regionally unique buildings started in the 1970s and was focused on public buildings such as museums and government buildings. However, despite the effort to apply local materials and attempts to reflect Jeju's natural environment in building designs, Jeju architecture has been heavily criticized as architectural ornamentation. It seems clear that Jeju Island, like much of the developing world, has lost its heritage to international style and globalism.

Therefore, the purpose of this study is to suggest a way to revitalize Jeju's local identity through architecture that can reflect cultural values and a sound understanding of the local environment. The final product of the thesis is to design "Jeju House" that can be personalized based on Jeju local residential needs and also that can be mass customized. The mass customization of Jeju House should increase the affordability of housing so it can be distributed widely on Jeju Island in various design forms.

Jeju house will be created with the essences of the traditional Jeju house, *Chojip*. It will deliver the architectural, philosophical, environmental and cultural concept of *Chojip*. In addition, innovative use of materials and technology will be incorporated with the regional uniqueness and traditional wisdom of how to survive in the harsh local environment. My research questions are as follows:

- (1) What are the characteristics of Jeju architecture?
- (2) What do Jeju residents think about Jeju architecture?
- (3) What elements are necessary in order to create “local identity” in Jeju architecture?
- (4) How can those elements be reflected in a real building design?

The completed research will provide an important process that leads to the final product, Jeju House. The process includes the following stages.

- Stage 1: The Study of Jeju Island
- Stage 2: The Investigation of Vernacular Architecture, *Chojip*
- Stage 3: Site Analysis
- Stage 4: Understanding Mass Customization in Architecture
- Stage 5: Case Studies: International and Korean
- Stage 6: Survey analysis: Jeju people’s attitude towards *Chojip*
- Stage 7: Designing a Mass Customized Building, Jeju House

The findings from each stage will be implemented in a creative way through my design. The final design will also reflect the changing lifestyle of the 21st century Jeju visitors and residents while harmonizing with the local culture, customs and natural environment.

Chapter 1: The Study of Jeju Island

1.1 GEOGRAPHICAL BACKGROUND

Jeju Island is located off the southern coast of Korea (See Figure 1). As Korea's largest island, it has a total land area of 715 square miles with a population of about 600,000. As a volcanic island, Jeju has three well-known Natural Heritage Sites that show significant volcanic features; *Manjang* cave (the longest lava tube in the world), Mt. *Halla* (a volcanic mountain) located in the middle of the island and *Sungsan* Sunrise Peak (a volcanic crater). Jeju is also covered with 368 parasitic cones, locally called *oreum*. Jeju has dried rivers that only run when it rains, but otherwise stay dry all year round. During the monsoon season (July-August), flooding can occur around the dried rivers and estuaries. A number of old villages were formed around coastal areas where spring water sources were located.

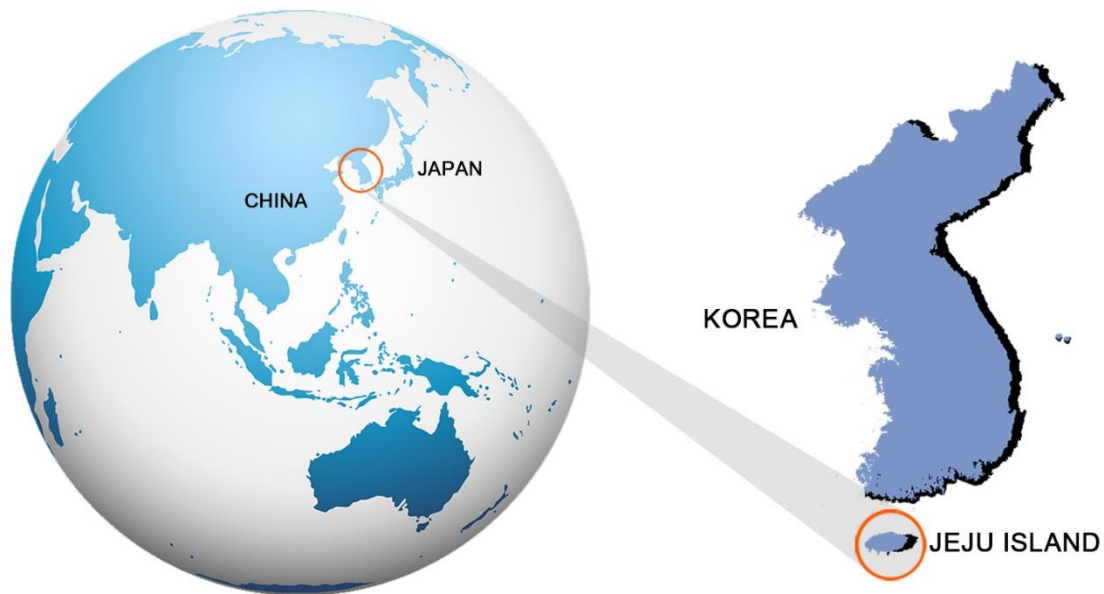


Figure 1: Jeju Island in the world.



Figure 2: Satellite image of Jeju Island.

1.2 CLIMATE

Jeju Island is located between the subtropical and the temperate climate zones. The average temperature is lower than other places located in the same latitude of the earth, with an average temperature of 11 degrees Celsius.² As can be seen Figure 3, even in winter the temperature does not reach freezing, however, because of strong winds, the sensible temperature is lower than the actual temperature.

² “Jeju Special Self-Governing Province,” Jeju Special Self-Governing Province, 21 April, 2015 <<http://english.jeju.go.kr/?sso=ok>>.

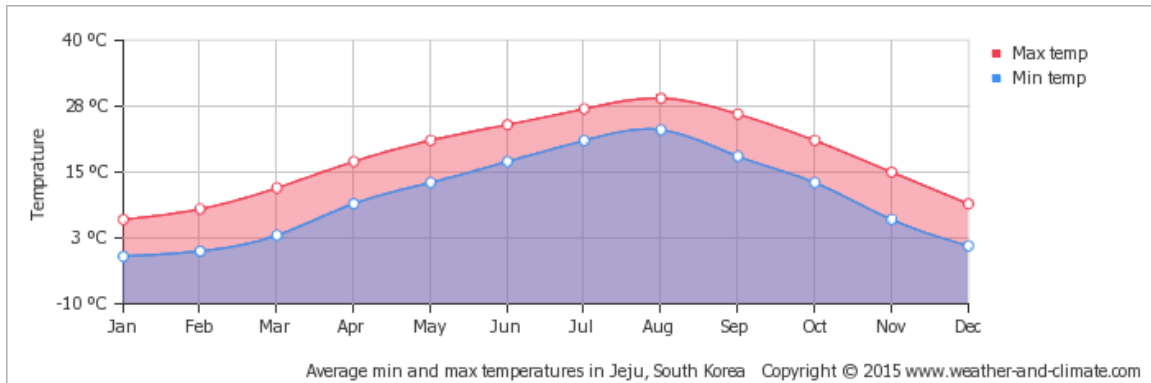


Figure 3: Average minimum and maximum temperatures in Jeju.³

In summer, several typhoons hit the island accompanied by heavy rains and strong winds damaging houses and infrastructures to varying degrees. Figure 4 below shows the average monthly precipitation over the year. The wettest months are also the hottest months.

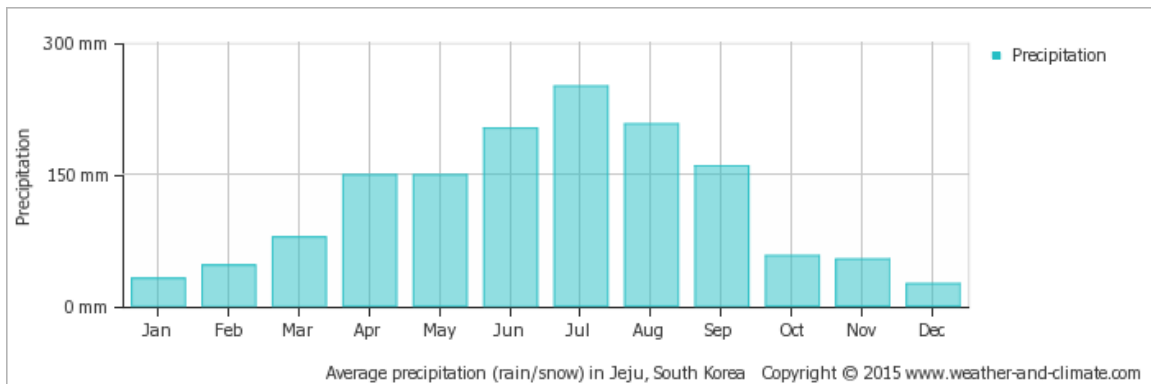


Figure 4: Average monthly precipitation over the year (rainfall and snow).⁴

³ “World Weather & Climate Information,” Average minimum and maximum temperatures in Jeju, 22 Oct. 2015, <<https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,jeju,South-Korea>>.

⁴ “World Weather & Climate Information,” Average monthly precipitation over the year (rainfall and snow), 22 Oct. 2015, <<https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,jeju,South-Korea>>.

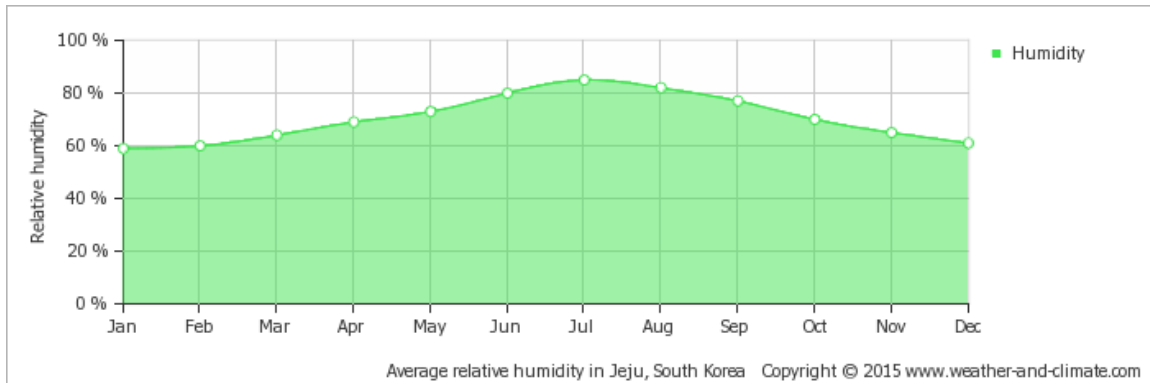


Figure 5: Average relative humidity in Jeju.⁵

1.3 JEJU HISTORY

Jeju Island was once called *Tamra* and was an independent kingdom during the Three Kingdoms (*Koguryeo*, *Baekje* and *Silla*) period (57 BC – AD 668) in Korea.⁶ *Tamra* later lost its independence in 1153 to *Koryeo* which united the Later Three Kingdoms (*Koguryeo*, *Baekje* and *Silla*) and changed its name to “Jeju 濟州” in 1295.⁷ Jeju literally means ‘province across the sea’ in Chinese.

1.3.1 MONGOLIAN INVASION (1231- 1374)⁸

Mongols invaded *Koryeo* and made it a vassal state from 1231 to 1259. During that time, Mongols once again referred to Jeju as *Tamra*. The Mongols set up the administrative office called ‘*Tamra chongkwanbu*’ and controlled the island as a place for raising horses. During the Mongolian Invasion 12,000 people including soldiers moved into Jeju Island

⁵ “World Weather & Climate Information,” *Average relative humidity in Jeju*, 22 Oct. 2015 <<https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,jeju,South-Korea>>.

⁶ Kim Kong Chil, *Introduction to Tamnaeo* [*T’amnao yŏn’gu: Cheju pangŏn ŭi wŏllyu*]. (Seoul: Hanguk Munhwasa, 1999).

⁷ Kim Bong Ok, *Diachronic History of Jeju*. (Jeju: Munwha, 1987) 29.

⁸ Lee Young Kweon, *History of Jeju*. (Humanist, 2005) 66-86.

from the Korean Peninsula, which caused a shortage of daily necessities.⁹ The Mongolians maintained a presence on the island until 1374. The long period of contact with Mongolians have left a large number of Mongolian loanwords in Jeju related to horses and military terminology.

1.3.2 JAPANESE OCCUPATION (1910-1945)

Much later, in 1910, Jeju came under the control of the Empire of Japan. Education and the local economy were controlled by Japan. Farmers lost their land and students were repressed in schools and taught distorted histories. Most high-ranking officials were replaced with Japanese occupiers. The economy of Jeju Island suffered, and many Jeju islanders sailed to Osaka, Japan to find work. There was a direct sea route between Jeju and Osaka and by 1934 one fourth of Jeju population moved to Japan. Nearly every family in Jeju had a member living and working in Japan.¹⁰ When the independence movement spread, the islanders in Japan supported Jeju financially.

Among various groups for the independence movement, Jeju women divers called *Jomnyeo* or *Haenyeo* played also an important role. About 500 women divers protested against the Japanese's exploitation and corrupted officials.¹¹ Also, many other Jeju Islanders devoted their lives for their independence.

⁹ Lee Young Kweon, History of Jeju. (Humanist, 2005) 82.

¹⁰ Lee Young Kweon, History of Jeju. (Humanist, 2005) 292.

¹¹ Kim Bong Ok, Diachronic History of Jeju. (Jeju: Munwha, 1987).

1.3.3 THE APRIL 3 MASSACRE (1948)¹²

The April 3 massacre also called the 4.3 incident occurred in 1948 on Jeju Island. During the incident, 30,000 islanders (about one tenth of the population) were killed. The history had been kept silent until the year of 2000, when the Korean government finally announced the 4.3 special law to investigate the massacre. In the same year, on Oct. 31st, the late former president Noh Muhyeon apologized publicly about the incident.

After the Japanese occupation ended in 1945, Korea was still under the US Military Government without an independent Korean government for 3 years. During that period, a preparatory committee for the Korean government was created by pioneers and set up offices around the Korean peninsula. Jeju Island was one of the areas which set up the Council of People's Commissars to help found an independent nation. The council was comprised of respectable people who were anti-Japan activists and also worked as an autonomous village organization. Unlike the mainland, Jeju's council was united strongly and worked well based on the experience of working as a small community on the island showing a left-leaning political tendency. The committee later changed to the Democracy National Front founded by the left nationalists.

During postcolonial times Jeju Island continued to suffer from economic hardship. An important factor in this was the high number of returnees from Japan. Around 60,000 islanders came back from Japan with little money as economic exchange with Japan were banned. The main daily necessities used to come from Japan not from the mainland and about 1/4~ 1/5 of Jeju islanders worked in Japan and sent money to Jeju. Therefore, the act of banning economic exchange with Japan resulted in illegal activities involving higher-ranking people such as police and officials from the US military government.

¹² Lee Young Kweon, History of Jeju. (Humanist, 2005) 309-348.

The 4.3 massacre began after a march first shooting in 1947 at *Gwandeokjeong* Pavilion in Jeju City. There was a rally to celebrate the independence movement and to address political messages such as the strong support of the Moscow Conference, urging the resume of the joint commission of Russia and the US and achievement of unified independence. There was a large number of islanders gathered at the rally. However, an accident occurred after the rally when a police in a horse hit a child and left without any action. Remaining spectators on the street complained, but instead of apologizing, the police shot many of the demonstrators. A woman with a baby on her back died including 5 other civilians and 8 people were injured. The police insisted that it was self-defense. However, the civilians were not armed and most people were shot in the back. The police started to arrest the people who organized the rally. In reaction to that, islanders went on a general strike. Schools and the private and public sectors were all closed. The Jeju Provincial Office was also closed, followed by village offices, post offices, tax offices and banks. A letter was sent to the US military governor in Jeju by 140 public officers requesting the punishment of both the person who was responsible for the shooting and police executives.

The police under the US military government responded by designating Jeju a communist sympathizing island and began arresting protesters. The head of the police, Cho, Byeongok flew to Jeju from the mainland and began a large scale police crackdown on the island. The indiscriminate arrest led to the April 3 rebellion in 1948. Out of 24 police stations, 11 were attacked and 4 police officers were killed, eight were injured, and 2 went missing. Additionally, 8 civilians were killed, 19 were injured, while 3 guerrillas were killed and 1 guerrilla was arrested. The police accused April third rioters of being North Korean communists, which prompted the US military government to get involved in the Jeju situation. On May 10, 1948, there was the first general election in South Korea without

North Korea. Korea's very first National Assembly gathered with 2 members out of 200 not present because many Jeju Islanders did not vote. The refusal of the election led the government to arrest 6000 Jeju islanders. After the establishment of the Korean government, internal problems had to be solved to gain international approval. UN approval was scheduled in December, 1948 so that the US military and the new Korean government felt the urgency. The commander for the rebellion announced in October that whoever is 5 km inward from the coastline would be shot dead. On November 17, martial law was declared. Villages in middle mountainous areas were all burned and people were killed including women, children and elders. The original estimated number of guerrillas was 500 but 30,000 people were killed. The commander of the guerrilla unit died on June, 1949.

The story of this incident was written down but was banned for a long time and the author was tortured. As of 2015, the incident is still not taught in schools but the government has tried to comfort the souls of many of Jeju islanders' family members by performing a ritual service annually at a memorial building in Jeju City.

1.4 JEJU CULTURE AND SOCIETY

As Jeju is located remotely from the mainland Korea, it has developed a unique culture. Jeju Island used to be a prison for political exiles and it was one of the few opportunities for Jeju islanders to interact with people from the mainland of Korea. Even now, the mainland Monolingual Korean speakers and young Jeju people do not fully understand the traditional Jeju language.

Jeju is known to have three abundant resources; stone, wind and women. It is very obvious to guess stone and wind, as it is a volcanic island. However, in order to understand

the high number of women, one needs to understand Jeju history. Most Jeju men were killed during the Korean War and 4.3 massacre (about 30,000 people were killed)¹³ between 1948 and 1953, therefore, Jeju women had to support families and the number of women working in the ocean diving in and collecting seafood increased dramatically. Those women are called *haenyeo* ‘woman diver’ and they became the breadwinners in Jeju society. Jeju women were economically independent and respected in their family. The number of *haenyeos* has decreased and they are disappearing in modern Jeju, as few women want to do hard labor and *haenyeos* themselves do not want their daughters to work as a *haenyeo*.

Jeju is also well known for missing several more negative aspects of society; thieves, homeless, and gates. Traditionally, Jeju had narrow socioeconomic gaps and a culture of sharing food and work with neighbors. Therefore, mutual trust was strong within a village and traditional gates indicate that trust. Jeju’s traditional gate use three wooden bars to indicate whether the owner of the house is at home or not by placing all three bars up (when the owner is not at home) or down (when the owner is at home). The role of wooden bars was mainly to protect their houses from livestock.

1.5 MYTHS AND SHAMANISM

Jeju Island has a great number of myths and practices shamanistic rituals called *gut*. Although shamanistic rituals are no longer practiced in individual households as the result of the modernization effort by the Korean central government and the Jeju local government, some major rituals are still practiced symbolically such as *Tamnaguk Ipchun Gut Nori* (Spring welcoming exorcism of *Tamra*) in February. There are also numerous

¹³ Koh Seung Hahn, “A Social Movement for New Jeju Revitalization: Several Issues on Vision and Practice,” XII Congress of Rural Sociology 6-11 July 2008:288.

stories about traditional goddesses. One of the most famous goddesses in Jeju is *Seolmundaehalmang* ‘Grandmother *Seolmundae*’, the giant creator of Jeju Island. Also, the story about the patriarchs of Jeju’s three original tribes- Ko, Yang and Bu- is well preserved and promoted for tourism. The three holes believed to be the place where the three patriarchs of Jeju, also founders of the *Tamra* Kingdom, emerged from are protected by the local government and used as shrine by descendants.¹⁴

1.6 ECONOMY

Although Jeju has a beautiful environment, the land with volcanic ash soil makes it difficult for growing rice. Therefore, barley, sweet potatoes and potatoes used to be the main crops for farming. The tangerine industry has also been the most important agricultural commodity as 672,000 tons are still produced annually. Since the 1970s, tourism has taken over the Jeju economy. International tourists come mainly from South and East Asian countries and it is the result of the Korean Wave supported by Korean pop culture. Jeju Island often appears in Korean movies and TV dramas and many of those drama and movie sets have been turned into tourists’ attractions.

In recent years, in order to achieve socio-economic development, the Jeju Special Self Governing Province initiated the New Jeju Movement campaign, which aims to restructure the social system and develop Jeju’s unique community identity while actively interacting with the outside world. This top-down initiation is to reduplicate the success of the *Saemaul Undong* ‘new village movement’. In the 1970s the movement occurred across Korea controlled by the central government and led to the modernization of Korea. However, Koh addresses the vague conceptualization of the campaign and lack of concrete

¹⁴ “Introduction of Samsunghyeol,” *Samsunghyeol*, 20 April. 2015
<http://www.samsunghyeol.or.kr/sub/?p=2_sacrifice>.

plans and projects, shortage of professional personnel, and less focus on the voice of community members. He also points out the need for systematic evaluation criteria on the movement.¹⁵

¹⁵ Koh Seung Hahn, "A Social Movement for New Jeju Revitalization: Several Issues on Vision and Practice," XII Congress of Rural Sociology 6-11 July 2008:288.

Chapter 2: The Investigation of Vernacular Architecture, *Chojip*



2.1 JEJU TRADITIONAL HOUSE: *CHOJIP*

Chojip is a traditional Jeju house, called *Choga* on the Korean mainland. Unlike *Hanok*, *Chojip* has not attracted much domestic and international research and architects as they are less prestigious compared to *Hanok*. Historically, compared to other regions of Korea, the need for *Hanok* was limited as Jeju had only a small number of high ranking officials from the mainland. Although *Chojip* has received some minor attention, it was the most common house across the island and built widely until the 1960s. *Chojip* in Jeju shows distinctive characteristics compared to the mainland *Choga*. Some of the differences are as follows:¹⁶

¹⁶ Seward Carey, "Still Standing Strong – Jeju's Thatched House Reveals Ingenuity of past Generations," *Jeju Weekly*, 18 Sep. 2009, 3 Nov. 2015 <<http://www.jejuweekly.com/news/articleView.html?idxno=283>>.

1. Jeju *Chojip* uses straw, which comes from wild weeds for the thatch, while rice straw was used on the mainland.
2. Jeju *Chojip* has a separate heating place called *kulmuk* ‘fireplace’ for rooms rather than using the heat created in the kitchen.
3. While the space separation in *Hanok* and *Choga* in the mainland is based on gender, for instance, *anchae* is designated for women and *sarangchae* is designated for men, on Jeju Island, it is based on different generations. For example, *Angeri* is for the parents’ generation and *bakgeori* is for the son’s generation.¹⁷
4. Jeju *Chojip* does not have a chimney.
5. Jeju *Chojip* uses volcanic rocks for walls and fence.
6. Jeju *Chojip* uses three bars called *jungnang* at the entrance to protect the house from livestock and also to indicate whether the owner of the house is at home or not.
7. Jeju *Chojip* has volcanic stone fences.

During the 60’s and the 70’s, as a result of the *Saemaul Undong* ‘New village movement’ and tourism development, dramatic changes in housing occurred replacing Jeju *Chojip* with modern houses. In addition, there was a significant decrease in the number of carpenters who knew the traditional way of building *Chojip* along with the introduction of generalized building techniques, lifestyle and materials such as cement / concrete and slate that all led to the end of *Chojip*.

¹⁷ “Academy for Korean Studies,” *Encyclopedia of Korean Culture*, 23 Nov. 2015 <<http://encykorea.aks.ac.kr/Contents/Index>>.

2.1.1 COMPARISON OF *CHOGAS* FROM DIFFERENT REGIONS OF KOREA

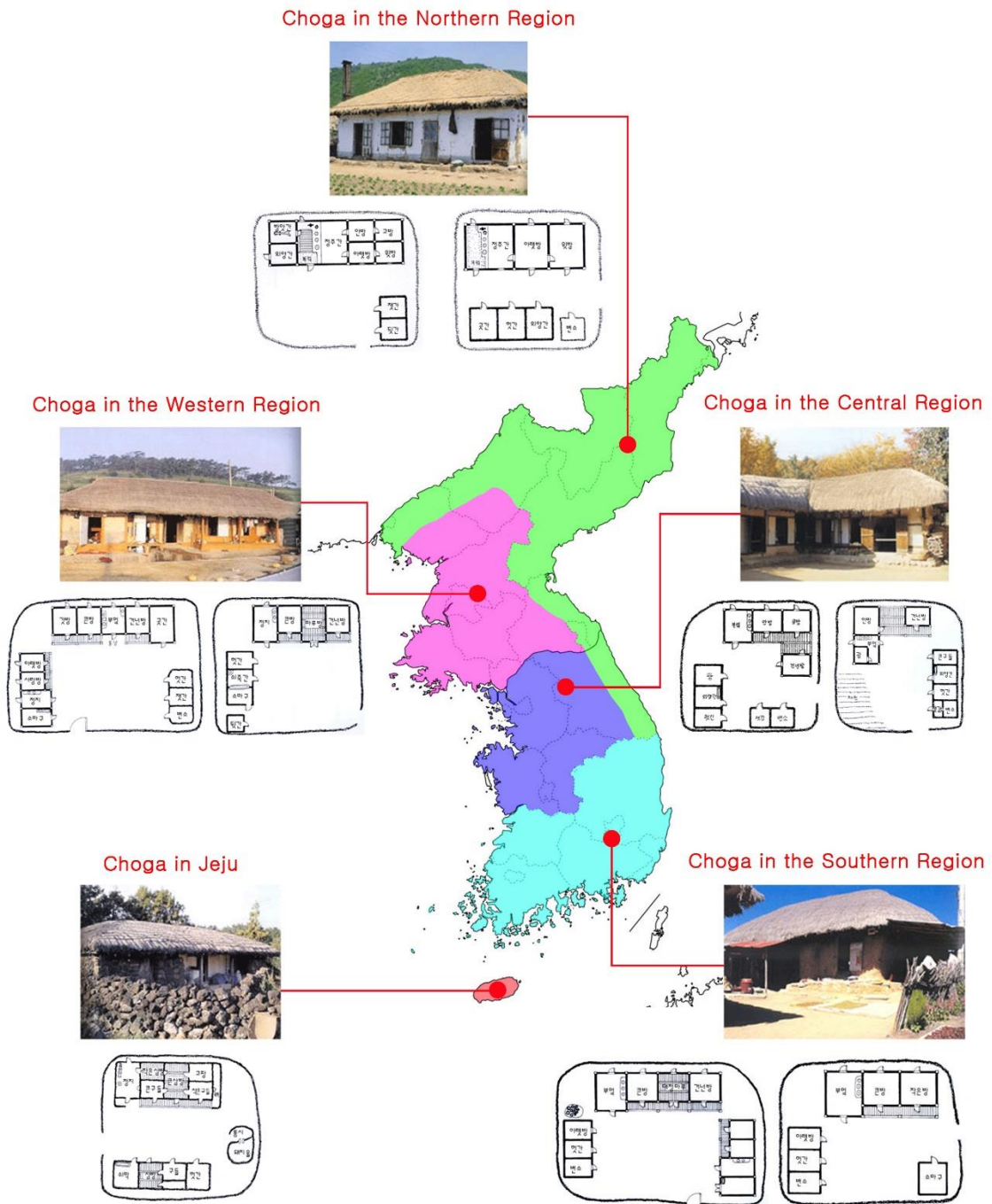






Figure 6: Comparison of *Chogas* from different regions of Korea.

2.2 TERMINOLOGY

2.2.1 BUILDING STRUCTURE

Jeju *Chojip* includes various building structures. They are listed in Table 2 below. The type, number and size of building structures vary depending on each family's wealth.

Name	Meaning	Description	Picture
<i>Angeori</i>	'Inner house'	A main building where parents' generation resigns.	
<i>Bakgeori</i>	'Outer house'	An outer building where son's family usually resigns.	
<i>Mokgeori</i>	'Side house'	An extra building (annex) used as a barn or a residence.	
<i>Imungeori</i>	'Gate house'	A main entrance / gate of a house.	





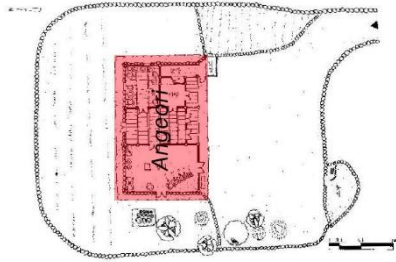
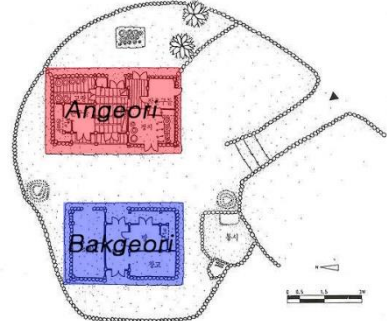
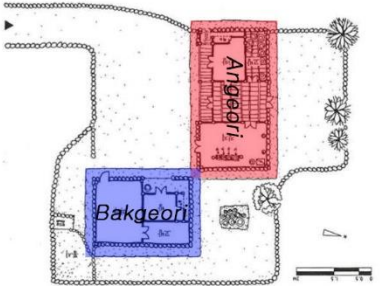
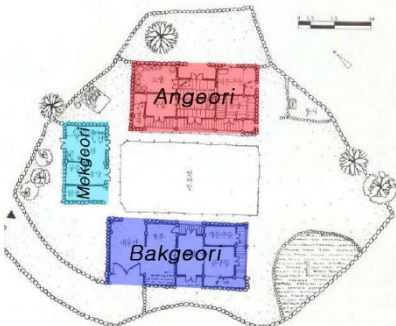
<i>Jeongjigeori</i>	‘Kitchen house’	A building which only has a kitchen.	
<i>Tongsi</i>	‘Toilet’	An outdoor toilet including a pigpen.	
<i>Malmak / Soemak</i>	‘Horse barn’ / ‘Cow barn’	A barn (for cows or horses)	
<i>Heotgan</i>	‘Barn’	A barn for keeping various things	

Table 1: Building structures within a *Chojip*.

2.2.2 TYPES AND ARRANGEMENT

The type of *Chojip* is often characterized by how many building structures it contains - minimum one to maximum four buildings. As can be seen in Table 2 below, when *Chojip* have only one building, it is called *oegeori* ‘single house’. When *Chojip* is

comprised of two, three and four buildings, they are each called *dugeori* ‘double house’, *segeori* ‘triple house and *negeori* ‘quadruple house’ respectively.

Name	Meaning	Description	Picture
<i>Oegeori</i>	‘single house’	One main building.	
<i>Dugeori</i>	‘double house’	It is composed of two buildings – <i>angerori</i> and <i>bakgeori</i> . The two buildings either face each other or are placed in an L shape (the <i>bakgeori</i> is located diagonally from the <i>angeori</i>). This is a primary arrangement of <i>Chojip</i> .	 
<i>Segeori</i>	‘triple house’	It consists of three buildings – <i>angeori</i> , <i>bakgeori</i> and <i>mokgeori</i> .	

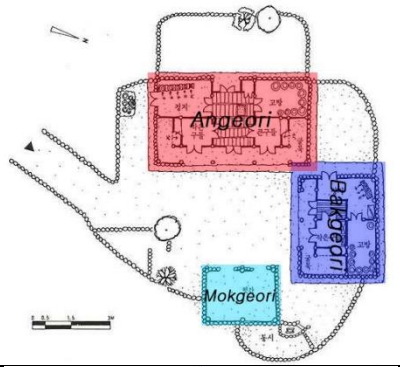
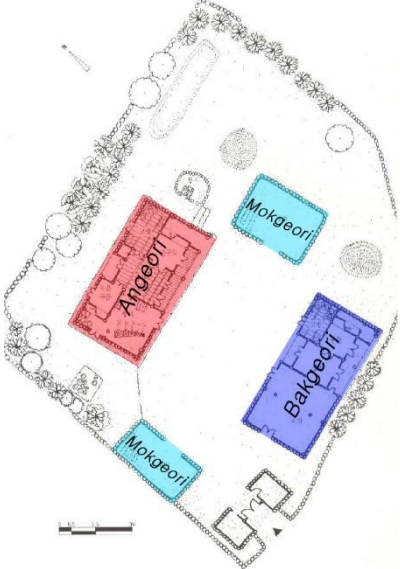





			
<i>Negeori</i>	‘quadruple house’	<p>It comprises four buildings – <i>angeori</i>, <i>bakgeori</i>, <i>mokgeori</i> and <i>jeongjigeori</i>. The four buildings are placed in a square shape while <i>angeori</i> and <i>bakgeori</i> face each other.</p>	

Table 2: Types and arrangement of *Chojip*.

2.2.3 OUTSIDE FEATURES

Chojip contains unique outside features compare to *Choga* found in the mainland such as *olle*, *andwi*, *ujat*, *uyeong*, *nurwat* and *janghanggup*, which are described in more detail below.

Name	Description	Picture
<i>Olle</i>	A narrow walkway to a house from the road.	
<i>Andwi</i>	An outside space behind kitchen and the living room.	
<i>Uyeong</i>	<i>Uyeong</i> is a vegetable garden located around house. <i>Uyeong</i> is a very important space as it provides everyday vegetables.	
<i>Nulgup</i>	A place to stack up barley, millet, and straw. It has a stone base (40~50cm high) to avoid the contact with water on the ground.	
<i>Janghanggup</i>	Platform for crocks of sauces and condiments.	

¹⁸ Kim Tae Il. *Nulgup*. Digital image. Jejusi. Web. 2 Nov. 2015.


<p><i>Jeongnang and Jeongjumeok</i></p>	<p><i>Jeongjumeok</i> (stone pillar with three holes in it) and <i>Jeongnang</i> (wooden bars) are set up inside the <i>olle</i>, the path leading to a house that served as a front gate. Two stone pillars are erected on both sides of <i>olle</i>. Each pillar has three holes in it. The three wooden bars called <i>jeongnang</i> are placed across the pillars. One to four <i>jeongnangs</i> are used depending on the household.</p>	
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Table 3: Outside features of *Chojip*.

2.2.4 PLAN AND SPACE OF *CHOJIP*

The main building of the *Chojip* is *angeori* and it consists of *sangbang*, *jeongji*, *gopang*, *gudeul*, *chaetbang*, *nangan* and *muhlmak* (or *soemak*) and *gulgumuk*. The second building, which is for the son's generation, *bakgeori* consists of *sangbang*, *jeongji*, *gopang*, *gudeul*, *nangan* and *molmak* (or *soemak*) and *gulgumuk*.



- A) Mungan (Gatehouse)
- B) Heotgan (Farm equipment storeroom)
- C) Gopang (Storeroom)
- D) Gulmok (Fireplace)
- E) Keungudeul (Large heated room)
- F) Sangbang (Central room)
- G) Jageun Gudeul (Small heated room)
- H) Jeongji (Earth-floored kitchen)
- J) Tongsi (Toilet)

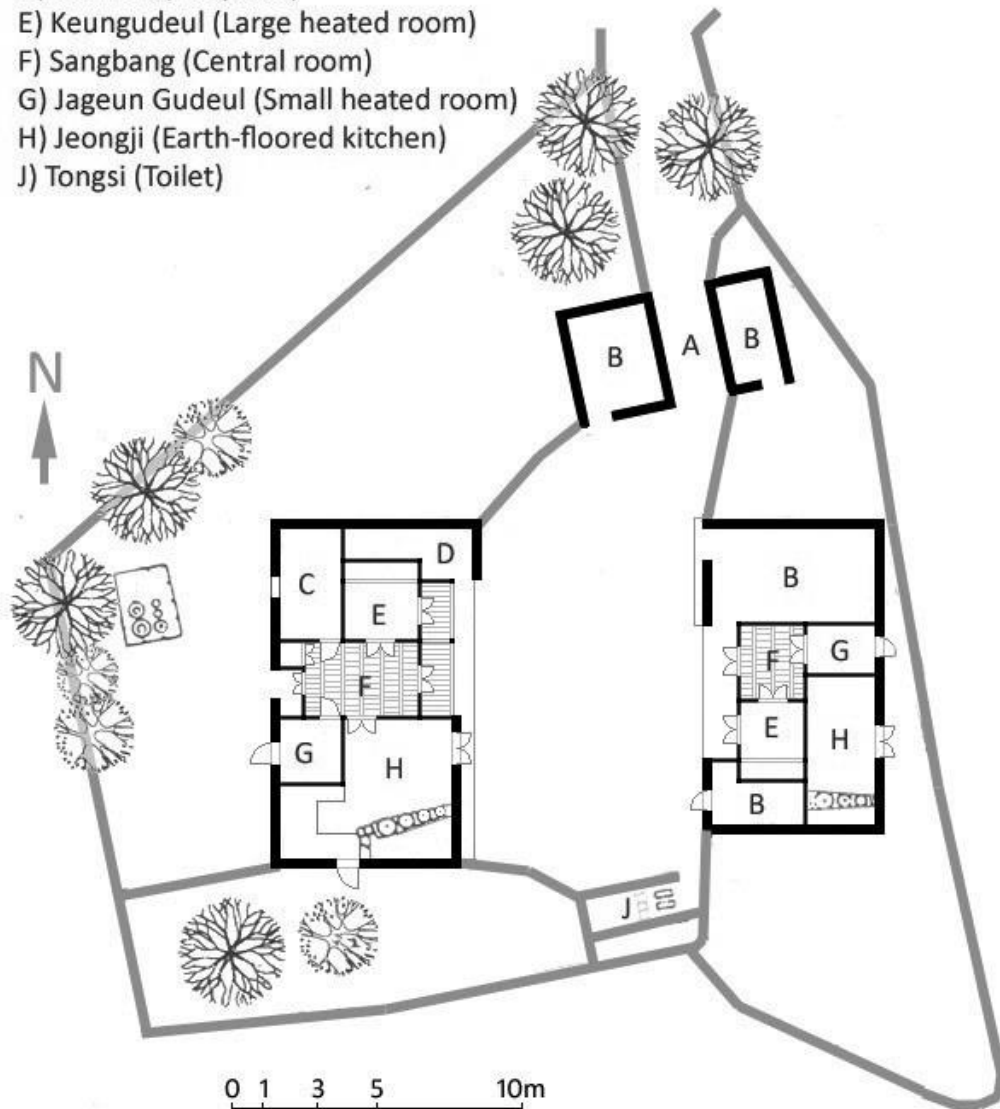


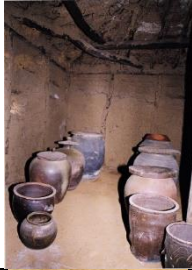




Figure 7: Han, bong il's *Chojip* and its plan.¹⁹

¹⁹ Han Bong-il House (late 19th century onward). Digital image. Asian Historical Architecture. Asian Historical Architecture. Web. 26 Nov. 2015.

Name	Description	Picture
<i>Sangbang</i>	A floor room, which is located in the middle of a house. It is equivalent to the living room. As a central room it is accessible to other rooms.	
<i>Jeongji</i>	The literal meaning of <i>jejongi</i> is 'clean place' and it is a kitchen. <i>Jeongji</i> consists of several fire pits divided by three volcanic stones with a dirt floor.	
<i>Gopang</i>	A storage room with dirt floor and mud wall. It stores grains. It is accessible from the <i>Keungudeul</i> 'a large room'.	
<i>Keungudeul</i>	A large room with a floor heating system, <i>ondol</i> . It has a door to <i>gopang</i> .	
<i>Jageungudeul</i>	A small room with a heating system, <i>ondol</i> .	

²⁰ *Gopang*. Digital image. Jeju Folk Village. Jeju Folk Village Museum. Web. 6 Dec. 2015.

²¹ Kim Tae Il. *Keungudeul*. 1987. Digital image. Jejusi. Web. 13 Nov. 2015.

²² Kim Tae Il. *Jageungudeul*. 1987. Digital image. Jejusi. Web. 13 Nov. 2015.






<i>Chaetbang</i>	A small dining room placed next to <i>jeongji</i> 'kitchen'.	 23
<i>Jangbang</i>	A built-in wardrobe in <i>sangbang</i> .	 24
<i>Nangan</i>	A narrow wooden porch.	
<i>Muhlmak</i>	A barn for horses or cows.	
<i>Gulmuk</i>	A fireplace to heat up a room located on the side of a building.	 25

Table 4: Indoor space of *Chojip*.

²³ Jang Chang Min. *Chaetbang*. 2010. Photograph. *A Study on Design of House with Architectural Characteristics of Vernacular House in Jeju Island*. Yonsei university, 2010. 42.

²⁴ Jang Chang Min. *Jangbang*. 2010. Photograph. *A Study on Design of House with Architectural Characteristics of Vernacular House in Jeju Island*. Yonsei university, 2010. 43.

²⁵ Kim Dong Sik. *Jeju Choga*. 2006. Photograph. Ohmynews. Web. 3 Dec. 2015.



Name	Description	Picture
<i>Saengginmun</i>		 26
<i>Mulpang</i>	A platform for a <i>mulheobuck</i> ‘water pot’ located outside of the building.	
<i>Gorangkae</i>	A space for storing firewood and dried cow dung.	

Table 5: External space and features of *Chojip*.

2.3 STRUCTURE AND MATERIALS

2.3.1 GENERAL FEATURE

Jeju *Chojip* has several distinctive features. First, it has an oval-shaped roof, while other *Chogas* in the mainland of Korea have an inverted V-shape roof. The oval shaped roof is covered with wild weeds and fastened with *jipjul* ‘thatch rope’ like a net (grid type). The second distinctive feature is the *chukdam* ‘outer wall’. Traditionally, natural stones (usually volcanic stones) are gathered nearby and carefully piled up to build walls. Clay paste mixed with barley stalks is added to the stone walls to protect the inside from the rain and wind. However, this method also leaves chinks between stones and it allows the walls

²⁶ Go Pyeong-o House (1829 onward). Saengginmun. Digital image. Asian Historical Architecture. Asian Historical Architecture. Web. 2 Dec. 2015.

to breath like a living organism.²⁷ Dirt is used to build outer walls of *Choga* in the mainland.

Next, *Chojip* has a stone fence that is as high as eaves. The high stone fence protects the house from the strong wind creating a comfortable work station in the yard inside the house. The stone fence is stacked up with natural stones without any dirt or clay creating natural gaps between stones. The strong wind goes through between gaps that are naturally created and gets weakened. *Chojip* has no chimney because of the strong wind. In addition, Jeju *Chojip* has a separate heating place called *kulmuk* ‘fireplace’ for rooms rather than using the heat created in the kitchen.

2.3.2 GENERAL STRUCTURE

In the 18th century, Jeju *Chojip* had the five-*ryang* structure without the *kulmuk* ‘heating system’. The *kulmuk* appeared after the general *Chojip* structure moved on to the seven-*ryang* structure. After the *kulmuk* appeared the use of *puseop* ‘stone brazier’ in *sangbang* ‘living room’ was minimized.

Jeju *Choga* has a two-*goju* seven-*ryang* structure. It is different from the mainland structure, which uses three or five-*ryang*. This main difference may have been caused by wind. As Jeju consistently had a strong wind, Jeju *Chojip* needed one more *dori* ‘plate’

Another unique structure that appeared in Jeju *Chojip* is an inverted wooden column, where the root part of a tree is used for the top of the column, and the top part of the tree is placed in the ground. This way of standing the column has a shamanistic meaning but there are technical reasons as well. The root part of a tree is strong and big, it creates strong joints when it is connected to *bo* ‘beam’ and *dori* ‘plate’.

²⁷ “Choga (Thatched roof House),” Jeju Special Self-Governing Province – Culture and Nature, 5 Dec. 2015 <<http://english.jeju.go.kr/index.php/contents/culture-nature/samda/stones/beauty/choga>>.

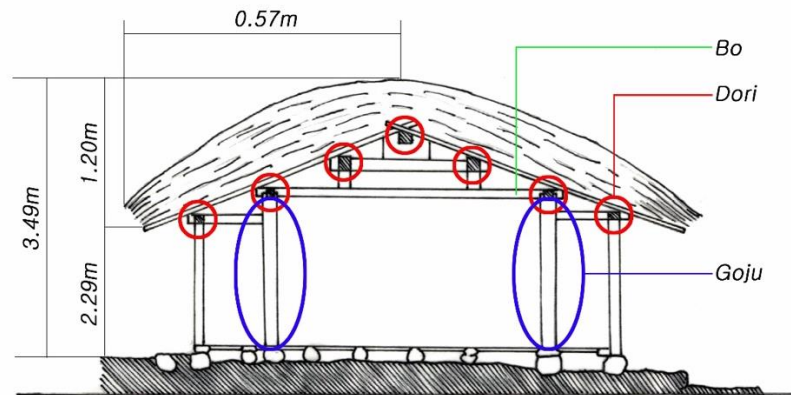


Illustration 1: Jeju *Chojip* structure (two-goju seven-ryang).

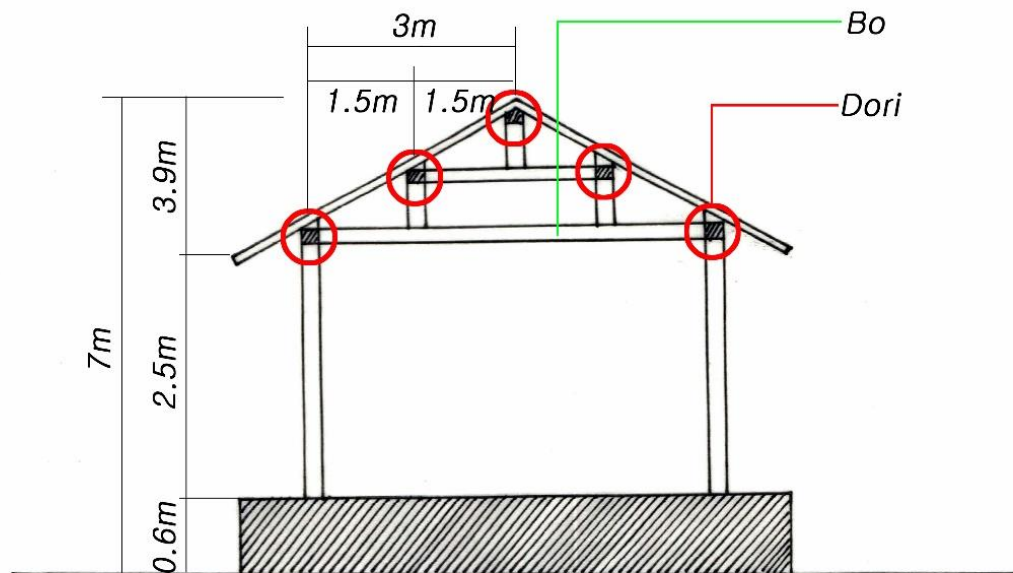


Illustration 2: *Hanok* structure in the mainland of Korea (three or five-ryang).

- **Column ‘*Gidung*’**

Wooden columns are put up upside down where the root part goes up to the roof in the *Chojip*. This method differs from the mainland. The reason for this method is the result of shamanistic beliefs but also its technicality. The root part of a tree is the strongest and biggest so that it can fit well with other structural pillars such as *bo* ‘beam’ and *dori* ‘plate’.

- **Walls ‘*Byeokche*’**

The exterior stonewall in *Chojip* protects wooden materials used for the interior. Volcanic rocks used in Jeju are about 15-30 cm thick and they are stacked up about 1.9 m high. The stonewall has about 10cm gradient and is stacked up inward a little bit towards the top to increase the building stability.²⁸ *Chojip*’s walls are built between columns. Materials used for the interior walls can differ based on wealth but are typically clay or woodblock.

- **Roof ‘*Jibung*’**

Roof functions to protect the house from harsh wind and rain. Jeju *Chojip* uses straw called *sae*, which comes from wild weeds for the thatch. The roof is covered with several layers of *sae* and fixed with straw ropes. The ropes are tied to wooden cross rails under the roof. To minimize the resistance against strong wind, the roof slop is made gentle (oval shape or flat). In addition, the shape of the roof harmonizes well with the surrounding environment. The ceiling for *sangbang* ‘living room’ and *jeongji* ‘kitchen’ is covered with clay. The ceiling for *gudeul*

²⁸ Kang Mi Sun, “A Study on the Locality of Je-ju Island and Its Application to Contemporary Architecture - on the basis of investigation of traditional houses -,” Ewha Womans University Jan. 2001: 21.

‘room with the heating system’ has an extra ceiling frame and filled with clay between the frame and the ceiling to enhance insulation. Also, *pungchae* is installed to protect the house from the rain, wind and sunlight.

- **Fence ‘*Doldam*’**

Jeju *Chojip* has a volcanic rock fence. The fence slows down the wind and stays safe even after strong typhoons. The fence represents Jeju’s regional characteristics and can be found not only around houses but also around fields. Unlike the mainland, it is stacked up with a single layer and it is about 1.7 m tall.²⁹

- **Windbreak ‘*Pungchae*’**

Pungchae is a kind of shield that can open and close. It has a bamboo framework and covered with *sae* ‘wild weed’, the same material used for a roof. It stands right outside of a building and it protects the house from rain, wind and sunlight.

- **Living room ‘*Sangbang*’**

Sangbang ‘living room’ has good ventilation as air can enter through the front and back doors. It is suitable for the weather in summer, which is hot and humid. As there is space between the wooden floor and the ground, the air can circulate below the floor and the above the floor. This air circulation can also cool down the temperature in summer.³⁰

²⁹ Kim Nee Ryeong and Cho Sung Ki, “A Study on the Influence of Climatic Environment in the Formation of the Vernacular Houses in Cheju Island,” *Architectural Research* Vol.14 No.3, Jan. 1998: 231.

³⁰ Lee Chang Hee and Park Chung Keun, “A Study on the Environmentally-Friendly Characteristic of Traditional House in Jeju,” *Architectural Research* Vol.16 No.2, May 2014: 95.

2.3.3 GENERAL MATERIALS

- **Wild weed ‘*Sae*’**

Sae is a type of wild weed easily found in Jeju. *Sae* is used to make the thatch for roofs. The best *sae* is harvested before it blossom in the autumn near the mountain *Halla*. They are dried in the sun after harvesting, and can be constructed for various purposes by winter.

- **Volcanic rocks ‘*Hyeonmuam*’**

Volcanic rocks were easily found building materials. Also, they were at one time used to make appliances such as *mortars*, *buseops* ‘braziers’ and farming tools. Most importantly, it was used to make fences for houses and fields. *Jeongjumok* ‘gate’, fire pits in *Jeongji* ‘kitchen’, a platform for *mulheobuck*, ‘water pot’ were all made by volcanic rocks.

- **Wood**

Traditionally, wood was used for buildings with soil and rocks. As wood is lighter than other materials, it is easy to shape and maintain. It is usually used to make the structure of a house, floor of *sangbang* and *nangan* and doors.

2.4 JEJU CULTURE AND SPACE IN *CHOJIP*

2.4.1 INDOOR SPACE

- *Sangbang*



Sangbang, ‘living room’ is located in the middle of *angeori*, the main building and can be entered through *daemun* ‘big door’ in the building’ and *nangan* ‘wooden porch. From *sangbang*, all other rooms located in *angeori* can be accessed

to such as *jeongji* ‘kitchen’, *gudeul* ‘room’, and *gopang*, ‘storeroom’. *Sangbang* plays a very important role not only for everyday family life but also for special occasions such as weddings, funerals, entertainment, and hosting guests. *Sangbang* is the nucleus of the house and where *Munjeonsin* ‘God of the front door’ lives.³¹ Also, when performing the ceremony of the completion of the framework of a house, the *seongjugidung* ‘ridge beam’ in the *sangbang* is cleaned with chicken blood. In addition, when performing an ancestral ritual called *sikge*, (*Jesa* in Korean), a separate table with food for *Munjeonsin* is prepared in addition to the main table for ancestors.³²

- *Gudeul*

In Jeju, rooms that have no *ondol* system are called *bang* or *pang* while rooms with the heating system are called *gudeul*. Therefore, it can be inferred that *sangbang* ‘living room’ and *gopang* ‘storeroom’ have no *ondol* system. In the three-room

³¹ Kim Hyong Jun, *Jeju architecture possess oneself of boundaries* [제주건축 경계에서 사유하기] (Seoul: Gyeongmunsa, 2011) 48.

³² Jejusi, *Jeju folk materials No.3-1* [제주시 초가 정밀실측 조사 보고서], (Jeju, 2006) 18.

house (*sekanjip*), regardless of the size, the room next to *gopang* ‘store room’ is called *keungudeul* ‘master room’ and the other room is called *jakeungudeul* ‘small room’. In *keungudeul* ‘master room’, one wall, which is adjoined *gulumuk* ‘fireplace’, which lies externally has a space to store blankets and chests. *Gulumuk* can be only accessed from outside or under the *nangan*, ‘wooden porch’.

- ***Gopang***

Gopang is usually located behind *keungudeul* ‘master room’ and opposite *jeongji* ‘kitchen’. *Gopang*’s main function is to store grains and important household materials. The entry to *gopang* is controlled by the owner of the house. When the owner gets older, his son’s family moves into *angeori* ‘inner house’ and the responsibility of looking after *gopang* is passed down the son. *Gopang* is considered to be family property and the reason for controlling the entry to *gopang* is to save one’s family’s property.³³

- ***Jeongji***

Unlike the Korean mainland, Jeju separates the kitchen and the heating system. The main function of *jeongji* is to cook. Plates are kept in *salle* ‘cupboard’ behind the kitchen. *jeongji* is usually located inside *angeori* ‘inner house’ or independently located in a separate building *mokgeori* ‘side house’. Married women used the Kitchen door to get into the main building as they were not allowed to use *daemun*, the main entrance to *angeori* ‘inner house’.³⁴

³³ Jejusi, *Jeju folk materials No.3-1* [제주시 초가 정밀실측 조사 보고서], (Jeju, 2006) 19..

³⁴ Jejusi, *Jeju folk materials No.3-1* [제주시 초가 정밀실측 조사 보고서], (Jeju, 2006) 19.

- ***Chaetbang***

Chaetbang ‘dining room’ is a unique space in Jeju *Chojip* as it is not found in the mainland. It is a place for dining and located between *jeongji* ‘kitchen’ and *snagbang* ‘master room’. It reduces walking distance for women.³⁵

- ***Nangan***

Nangan ‘wooden porch’ is a transfer space between the outdoor space, *madang* ‘yard’ and the indoor space *snagbang* ‘living room’. *Nangan* has versatile characteristics. For instance, it provides space to store items for a short period time. Also it lets light and air into the inner space. It is open to the outside and connects to the inside space. This space protects the inside space from rain and wind and is also important space for enjoying the sun.³⁶

2.4.2 OUTDOOR SPACE

- ***Olle***

Olle is the narrow path that connects the house to the main road. It is a unique space, which is found only in Jeju. It creates independency and privacy for the home while separating the house from the outside. *Olle* is usually wavy, which helps to impede the view of the inner house from the road. However, when *olle* is short or straight so that *angeori* ‘inner house’ can be seen from the outside, an extra house such as *bakkeori* ‘outer house’ or a barn is built between the end of the *olle* and the main house to increase privacy and to protect the house from wind.³⁷

³⁵ Jejusi, *Jeju folk materials No.3-1* [제주시 추가 정밀실측 조사 보고서], (Jeju, 2006) 20.

³⁶ Jejusi, *Jeju folk materials No.3-1* [제주시 추가 정밀실측 조사 보고서], (Jeju, 2006) 20.

³⁷ Jejusi, *Jeju folk materials No.3-1* [제주시 추가 정밀실측 조사 보고서], (Jeju, 2006) 20.

- ***Madang***

Madang ‘yard’ is the center for agricultural related work and family events. Buildings are arranged around the *madang*. The distance of the two buildings, *angeori* ‘inner house’ and *bakgeori* ‘outer house’ is about 7~8m. This distance allows satisfactory sunlight and ventilation for both buildings. The *madang* also increases privacy for parents and son’s family. The ratio of *madang* (distance of an inner house and outer house) and building height is usually 2 to 1.³⁸

- ***Andui***

Andui is located in the back of *angeori* ‘inner house’. *Andui* is kept private from outsiders or visitors by a stonewall. The stonewall around *andui* is higher than any other parts of the wall. Also, it is only accessible either from *jeongji* ‘kitchen’ or the back door of *sangbang* ‘living room’. It is not accessible directly from the *madang* ‘yard’. In *Andui*, symbolic trees are planted such as bamboos, camellia trees, persimmon trees, tangerine trees or evergreen witch hazel trees. There are also *janghanggup*, *chomhang* and *chilsungnul*.

Janghanggup is a platform for crocks of sauces and condiments and it is placed in the *andui* to protect them from negative spirits. In the past, sauces and fermented food were important staple food and they were kept in a place safe. *Chomhang* is a crock with straw inside. It collects rainwater. As Jeju is a volcanic island, water permeates through the ground. Therefore, when a village had no spring, people had to walk a long way to bring water. *Chomhang*, therefore, was a convenient and wise way of collecting water. *Chilsungnul* is a place to enshrine

³⁸ Jejusi, *Jeju folk materials No.3-1* [제주시 초가 정밀실측 조사 보고서], (Jeju, 2006) 20.

batchilsung ‘snake goddess’, who protects grains and brings richness. *Chilsungnul* has a stack of grain stalks. Another snake goddess, *anchilsung* is enshrined in *gopang* ‘store room’ which is itself located in the *angeori* ‘inner house’. As snakes were considered sacred, they were not killed. *Andui* is assigned for women and men could not enter.³⁹

- ***Tongsi***

Tongsi consists of a toilet and a pigpen. It is located near the *keungudeul*, a distance from the *jeongji* or next to the stone fence near *bakgeori* ‘outer house’. The reason for this arrangement is to make it as far as possible from *jeongji* and to hide it from the *madang* ‘yard’. The pigpen has space for pigs to lie down and has a roof on the side to protect from rain and wind. The toilet is located little bit higher than the pigpen. It has two stepping-stones with a fence just high enough to cover a person when they squat down and has no roof. Pigs in Jeju are very important assets and source of protein. Pigs are easier to raise compared to cows. Also, on special occasions such as weddings or funerals, a pig is killed and served as boiled pork or gulfweed soup, *muhmkuk*.⁴⁰

2.5 MYTHS AND SPACE

Jeju is known to be a land of myths and there are about 18,000 gods and goddesses that appear in various myths. It seems that Jeju islanders’ life has evolved with an endless numbers of myths and they have become who they are now based on their belief system melted in the story of myths.

³⁹ Jejusi, *Jeju folk materials* No.3-1 [제주시 초가 정밀실측 조사 보고서], (Jeju, 2006) 21.

⁴⁰ Jejusi, *Jeju folk materials* No.3-1 [제주시 초가 정밀실측 조사 보고서], (Jeju, 2006) 21.

- ***Bonpuli***

A *Bonpuli* is a shaman's song or tale about gods and goddesses in Jeju. While shamans perform a *gut* 'shamanistic ritual', they narrate or sing a story about relevant gods and goddesses. Two out of eleven *bonpulis* are related to *Chojip*. One of them is called *munjeonbonpuli* and it talks about the god of the gate. *Munjeonbonpuli* also introduces other gods related to each space in *Chojip*. Most importantly, the story reflects the meaning of each space.⁴¹

- ***Munjeonbonpuli* 'the tale of the god of the front gate'**

Munjeonbonpuli talks about gods of each space in a house and illustrates how *munjeonsin*, who is considered to be the most important god of a house was born. The story goes as follows:

"There was a poor man married with seven sons. His wife suggested him to leave their house and sell rice to make money. He then left and arrived in a village and got married again with a deceiving woman. After the marriage, his new wife took all his money and tortured him until he loses his vision. After a while, his first wife came to look for him but he could not recognize her. So, she cooked rice for him then the man noticed his first wife. His second wife became jealous so she pushed the first wife into the water. From then, the second wife pretended to be the first wife and went back to the man's hometown. His seven children welcomed their parents but soon they got suspicious of the woman. The second wife found out about that and lied to the man that she is sick and needed him to meet a fortuneteller for her. After he left, she ran to the fortuneteller's house and pretended to be a fortuneteller. She told the man that she could only live if she eats all seven sons' livers. When the man came home, he started to sharpen a knife. The youngest son, who was the smartest, told his father that he would take his brothers' livers out for him. Him and his brothers went up to the mountain and got six wild pigs' livers and brought them back to the woman. She pretended to eat them and put the livers under the bed. The youngest son saw her from the window and revealed her evil tricks to the world. After that, the woman ran to the toilet and hung herself and became the goddess of the toilet. The man

⁴¹ Hyeon Yong Jun, *Shamanism in Jeju Island and around of Jeju Island* [제주도 무속과 그 주변] (Seoul: Jipmoondang, 2002).

who felt embarrassed ran outside and tripped over at jeongnang 'outside gate' and died and became the god of jeongjumok, 'a wooden bar used for the outside gate (jeongnang)'. The seven sons obtained a reincarnation flower for their mother and brought her back to live again. They enshrined their mother as the goddess of the kitchen, Jowang. The first five sons became gods of five sides, obangtosin, protecting their family from each side. The sixth son became the god of the back door, duitmunjeon. The youngest son became the god of the front door, munjeonsin".⁴²

⁴² Hyeon Yong Jun, Shamanism in Jeju Island and around of Jeju Island [제주도 무속과 그 주변] (Seoul: Jipmoondang, 2002).

Chapter 3: Site Analysis for Jeju House

3.1 CRITERIA FOR THE SITE SELECTION

The decision on finding an ideal location for Jeju Houses is based on three criteria:

1. an area where the demand by the housing industry will occur in the near future,
2. where the Jeju House may harmonize well with the surrounding natural environment
3. where residents can travel efficiently

- **Housing Demand**

The first criterion for the site selection focuses on the likely potential for population increase. On November 10th, 2015, the Ministry of Land, Infrastructure and Transportation announced plans to build a second airport, which will have one runway on the southeastern part of Jeju Island by 2025 to cope with the growing number of passengers. The new airport project will cost about \$3.5 billion and will be constructed in *Sinsan-ri* and *Onpyeong-ri* of *Seogwipo* City. Therefore, it is expected to impact the housing industry as the new airport may likely attract a large population to settle near the periphery of the airport.

- **Harmonization with Surroundings**

The second requirement is to identify an area where a ‘Jeju House’ can harmonize with the natural environment and existing built structures. An ideal place for a site should have a clean and green natural environment with low-rise buildings.

- **Convenient Location**

Modern Jeju residents seek convenience in their everyday life. Therefore, it is important to locate the “Jeju House” close to streets and public facilities such as hospitals, schools and government offices.

3.2 SITE SURVEY

Location: Based on the above criteria, *Pyoseonri* was selected. It is located in southeast Jeju Island and 11.4 km away from the proposed airport. It takes approximately 15 minutes by car from the new airport (See Figure 8). This location is a slightly over the suggested minimum distance (10.9 km) to avoid airport noise.⁴³ The Ministry of Land, Infrastructure and Transport is currently providing compensation for the airport noise damage for residents living within 10. 2 km².⁴⁴ Any closer than this distance, residents may suffer from excessive noise. It is also 36.5 km away from the existing airport in Jeju City, the biggest city on Jeju Island. This location is also close to the beach; 5 minutes to *Pyoseon* beach by car. The site is 39,685 m² in area.

⁴³ The Ministry of Land, Infrastructure and Transport. “Second airport construction in Sinsan, Seoguiipo,” 23 Nov. 2015, <http://www.molit.go.kr/USR/NEWS/m_71/dtl.jsp?id=95076537>.

⁴⁴ The Ministry of Land, Infrastructure and Transport. “Second airport construction in Sinsan, Seoguiipo,” 23 Nov. 2015, <http://www.molit.go.kr/USR/NEWS/m_71/dtl.jsp?id=95076537>.



Figure 8: Distance between the site and the airports.

- **Background Information of *Pyoseonri***

Population: As of 2015, 4997 people live in *Pyoseonri*.

Size: *Pyoseonri* is 10.613 km² in area.

Economy: *Pyoseonri*'s main focus is on tourism, commerce, business and farming.

Climate: *Pyonseonri*'s regional climate is not available, therefore, the neighboring town, *Seongsaneup*'s meteorological data are used here. In 2014, *Sungsan*'s highest temperature was 31.1 °C on July 23rd. The lowest temperature was -2.7 °C in Dec. 18th. Also,

it snowed for 12 days.⁴⁵ The following figures show the mean temperature and mean precipitation of the last 30 years (1981 ~ 2010) of *Sungsan*. As can be seen in Figure 9, *Sungsan* (*Pyoseon*) showed distinctively different temperatures across seasons (spring, summer, fall and winter).

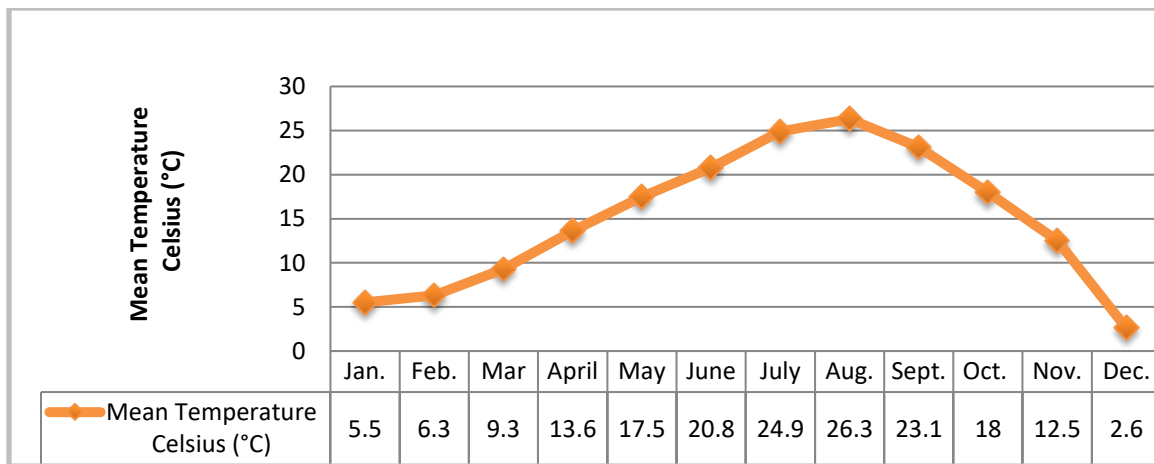


Figure 9: Mean Temperature.⁴⁶

As can be seen in Figure 10, during summer, precipitation increases dramatically and decreases during winter. *Pyoseon* is also affected by typhoons during summer. Four typhoons influenced *Pyoseon* in 2014.

⁴⁵ Korea Meteorological Administration, “Annual Climatological Report,” 2014, 24 Nov. 2015 <http://www.kma.go.kr/repository/sfc/pdf/sfc_ann_2014.pdf>.

⁴⁶ “Climatological Normals of Korea,” Korea Meteorological Administration, 2011, 20 Nov 2015 <http://www.kma.go.kr/down/Climatological_2010.pdf>.

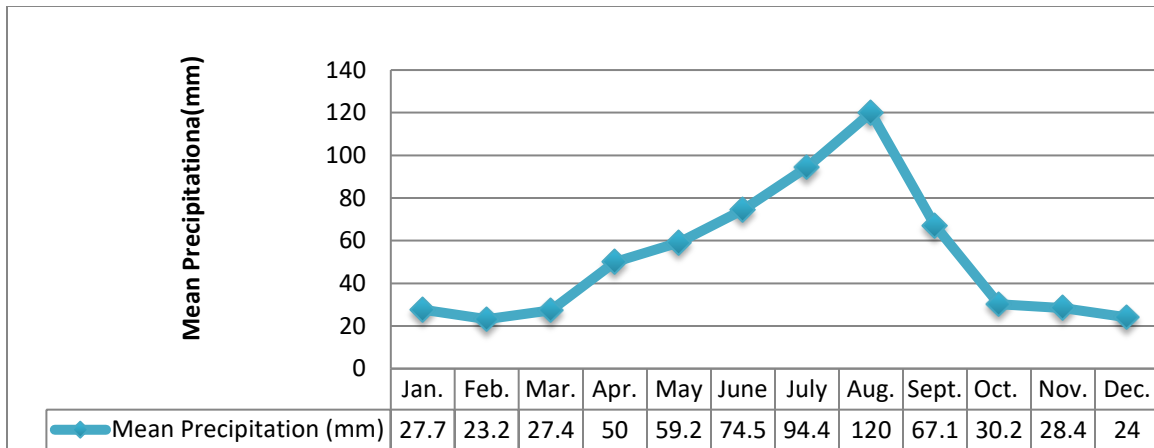


Figure 10: Mean Precipitation.⁴⁷

- **Wind**

30% of the wind comes from northwest. The mean wind speed is 3.2 m/s. The wind in this area is not very strong compare to other areas on Jeju.



Figure 11: Annual Wind.

⁴⁷ “Climatological Normals of Korea,” Korea Meteorological Administration, 2011, 20 Nov 2015 <http://www.kma.go.kr/down/Climatological_2010.pdf>.

- **Topography**

The site is located in the flat area closed to the beach.

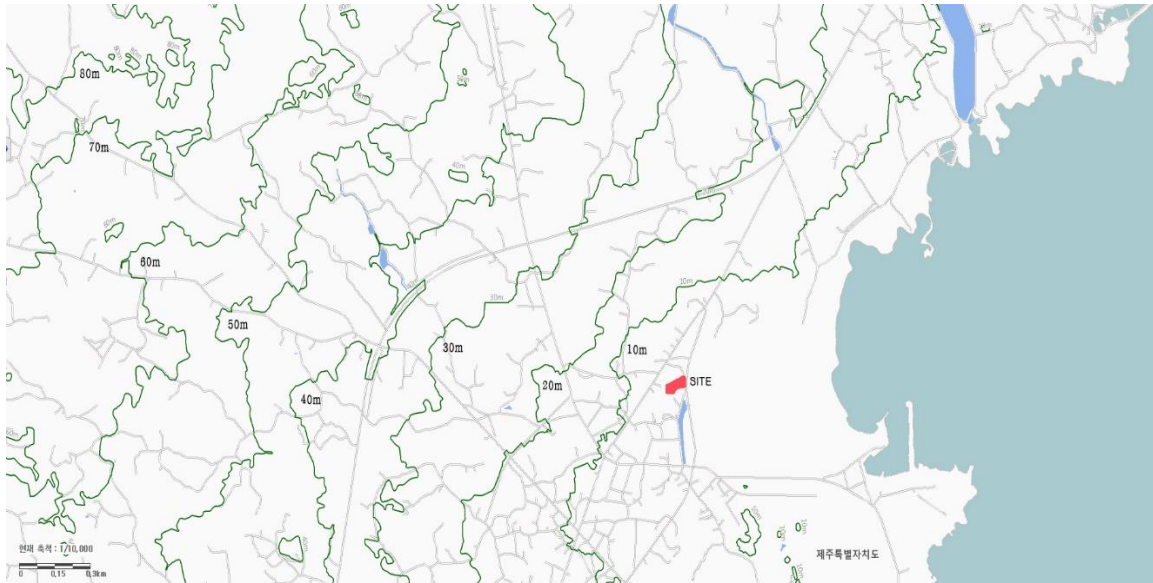


Figure 12: Site topography.



Figure 13: Site area.



Figure 14: Sky view of the site.

- **Immediate Surroundings**

There are three schools in walking distance. It takes about 5 minutes to *Pyoseon* Primary School on foot. It takes about 11 minutes to *Pyoseon* Middle School. It takes about 14 minutes to *Pyoseon* High school. Also it takes about 10 minutes to the main neighborhood structures such as markets, banks and pharmacies etc. on foot.

- **Landmarks**

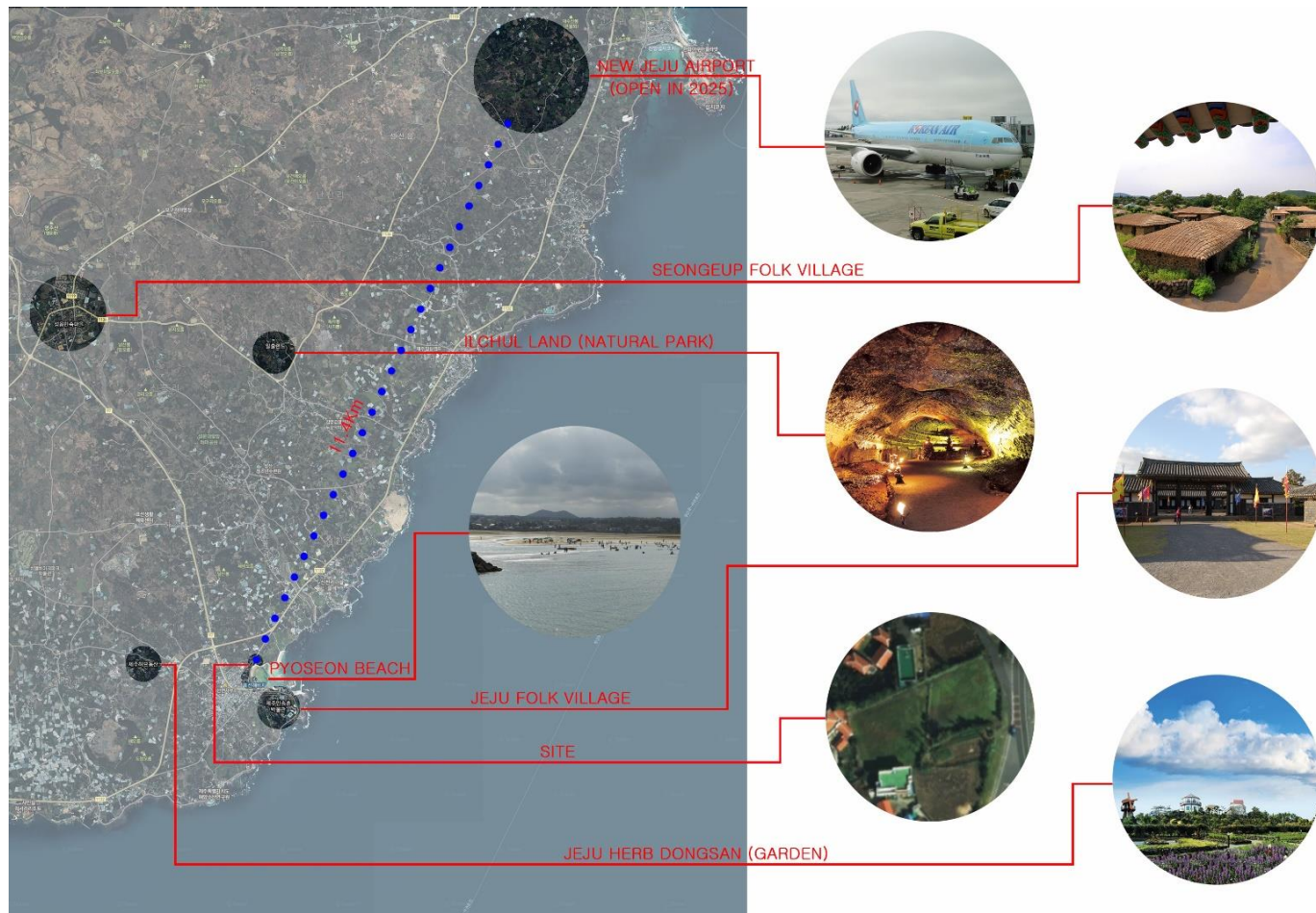


Figure 15: Site landmarks.

- **Land Use Regulation**

As can be seen in Figure 16, the white area is designated a “Management Area”. This area is flexible in terms of land use. The government can develop the land based on its need analysis. The green area indicates “Greenbelt for Protection”. The light green area across the coastal lines is protected as “Natural green area”. The pink area is “Residential area” and the yellow area is designated as “Management area”.

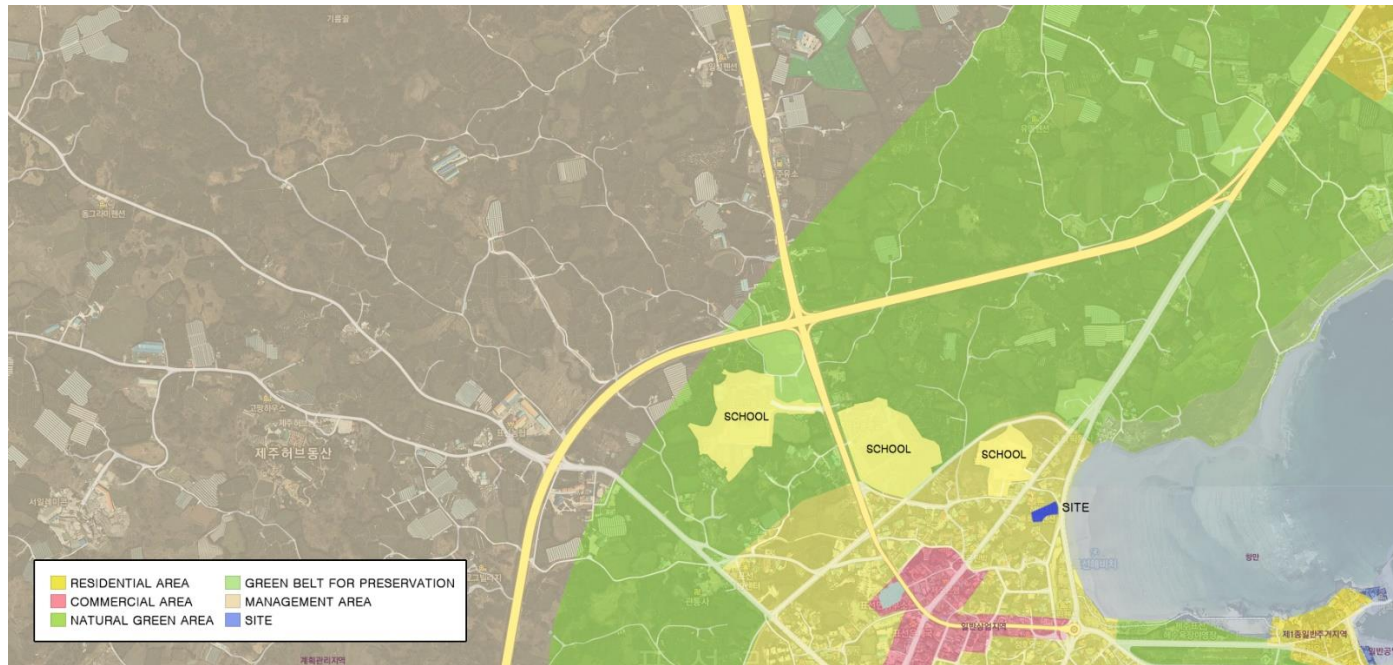


Figure 16: Land use regulation.

- **Existing Condition**



Figure 17: Vehicular circulation.



Figure 18: Pedestrian circulation.

Chapter 4: Mass Customization in Architecture

4.1 BACKGROUND

In the 21st century, the use of cutting edge technologies in building designs and implementing a mass customization system in the architectural industry has spread around the world. The most well-known architect who advocated ‘mass production’ in the field of architecture, Le Corbusier, said that “industry has created its tools; business has modified its habits and customs; construction has found new means; and architecture finds itself confronted with new laws”.⁴⁸ What he meant by these statements was that we are facing a new era of industrialized architecture where we need to create standardized buildings like manufacturing consumer products such as cars, shoes and kitchen appliances. According to Le Corbusier, standardization is important. The lack of standardization results in high costs in building construction. The following picture is his vision of a standardized mass production home.



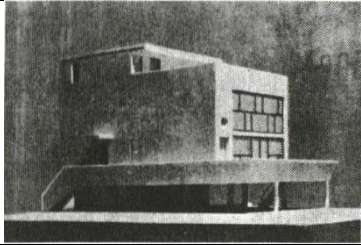
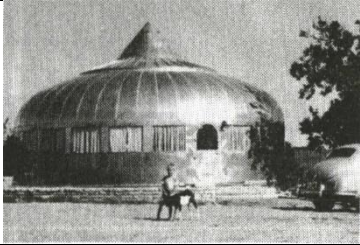

Figure 19: Mass-Production Villa, Le Corbusier, 1922.

⁴⁸ Etchells Frederick, Towards a New Architecture by Le Corbusier (Architectural Press, 1999) 283.

Le Corbusier pointed out that within 20 years “a house will no longer be this solidly-built thing... which is an expensive luxury by which wealth can be shown; it will be a tool as the motor-car is becoming a tool”.⁴⁹

However, after almost 100 years passed, his prediction has only partly become true. The main reason for the failure of mass production in architecture is that the low quality of mass production could not appeal to a wider audience. Also, individuals are not ready for “repetitive appearance and substance for all production”.⁵⁰

Kieran and Timberlake further introduce buildings that used mass production techniques such as modularization over the years but rather appeared to be unsuccessful in terms of gaining recognition.⁵¹

		
Le Corbusier 1910 ⁵²	Buckminster Fuller 1930 ⁵³	Frank Lloyd Wright 1940 ⁵⁴

⁴⁹ Etchells Frederick, Towards a New Architecture by Le Corbusier (Architectural Press, 1999) 235-237.

⁵⁰ Kieran Stephen and Timberlake James, Refabricating Architecture (McGraw-Hill, 2004) 104.

⁵¹ Kieran Stephen and Timberlake James, Refabricating Architecture (McGraw-Hill, 2004) 104.

⁵² Kieran Stephen and Timberlake James. *LE CORBUSIER*. 1910. Photograph. Refabricating Architecture. McGraw-Hill, 2004. 104. Print

⁵³ Kieran Stephen and Timberlake James. *BUCKMINSTER FULLER*. 1930. Photograph. Refabricating Architecture. McGraw-Hill, 2004. 104. Print

⁵⁴ Kieran Stephen and Timberlake James. *FRANK LLOYD WRIGHT*. 1940. Photograph. Refabricating Architecture. McGraw-Hill, 2004. 104. Print

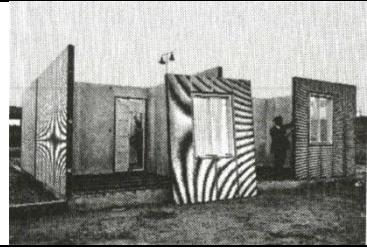
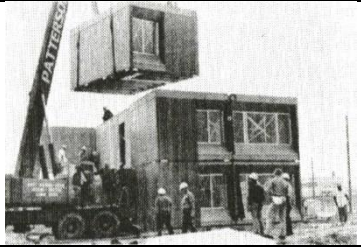
	
Walter Gropius 1960 ⁵⁵	Operation Breakthrough 1970 ⁵⁶

Table 6: A century of failures.

Now, what we can learn from mass production is that we need to integrate related parties such as customers, builders, material developers and engineers rather than just relying on one single architect's vision.⁵⁷

4.1.1 DEFINITION AND PRINCIPLES

Mass customization moving from mass production “denotes an offering that meets the demands of each individual customer, whilst still being produced with mass production efficiency. Today, mass customization is emerging from a pilot stage into a scalable and sustainable strategy”.⁵⁸

⁵⁵ Kieran Stephen and Timberlake James. *WALTER GROPIUS*. 1960. Photograph. *Refabricating Architecture*. McGraw-Hill, 2004. 104. Print

⁵⁶ Kieran Stephen and Timberlake James. *OPERATING BREAKTHROUGH*. 1970. Photograph. *Refabricating Architecture*. McGraw-Hill, 2004. 104. Print

⁵⁷ Kieran Stephen and Timberlake James, *Refabricating Architecture* (McGraw-Hill, 2004) 104.

⁵⁸ Piroozfar A.E. Poorang and Piller T. Frank, *Mass Customisation and Personalisation in Architecture and Construction* (London and New York: Routledge, 2013) 3.

The principles of mass customization are as follows:

- The use of innovative building strategies/technology (Computer software, robots): enables new design, increase flexibility
- Personalization: offers tailored solutions to individuals
- Efficiency: time, cost
- Sustainability: sustainable mass customization strategies/business⁵⁹

4.1.2 TECHNIQUES

There are several techniques that are being used for mass customization. First, the modulization technique is an additive design strategy that enables product variety by combining a range of standard physical or functional modules (mass produced).⁶⁰ With the modularization technique it is now possible to build multi-story buildings. The following hotel was built in England and reported that a half million pounds was saved and 10 weeks of construction time. This technique also reduced on-site waste.⁶¹

⁵⁹ Piroozfar A.E. Poorang and Piller T. Frank, Mass Customisation and Personalisation in Architecture and Construction (London and New York: Routledge, 2013) 17.

⁶⁰ Piroozfar A.E. Poorang and Piller T. Frank, Mass Customisation and Personalisation in Architecture and Construction (London and New York: Routledge, 2013) 81.

⁶¹ Jeffries Adrienne, "Travelodge Hotel made from Shipping Containers," Inhabitat, 8 Aug. 2008, 1 Nov. 2015 <<http://inhabitat.com/travelodge-shipping-container-hotel/>>.

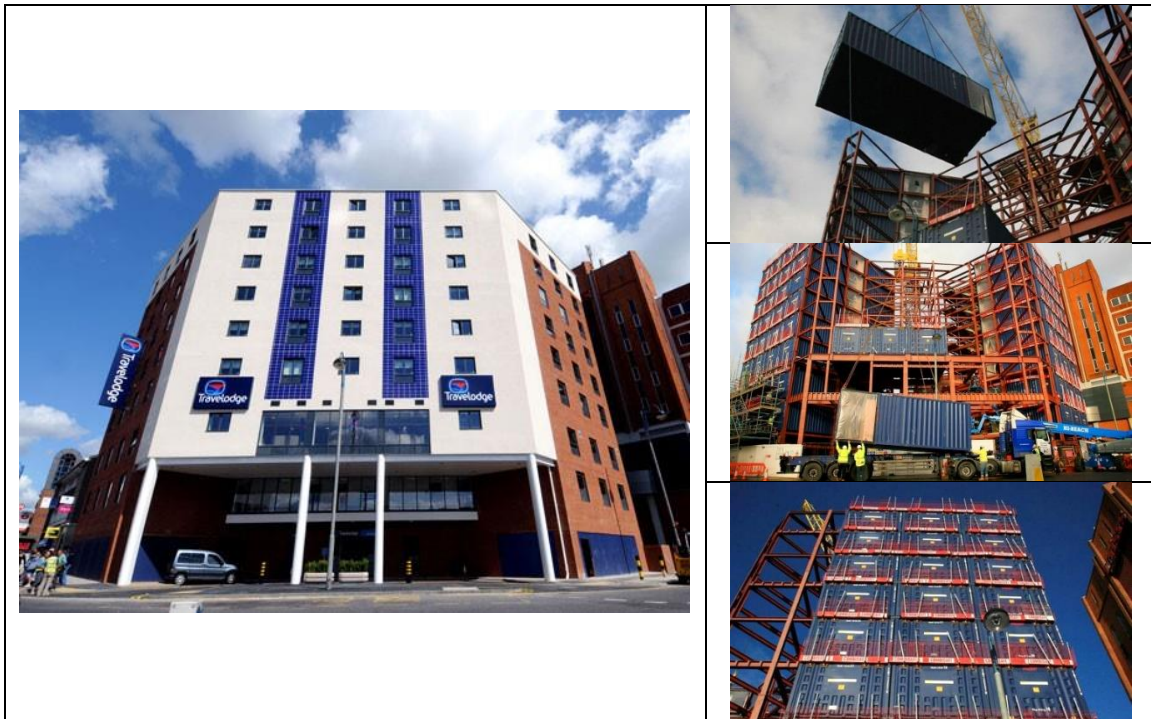


Table 7: Travelodge hotel.⁶²

However, again, it is arguable whether this hotel is attractive enough so that it can gain attention in the field of architecture and hold prestige for a long period of time rather than being a novelty for its cost and efficiency in construction time.

The next technique used in mass customization is prefabrication. With the advancement of technology, more complicated parametric designs are now able to be mass customized. As can be seen in the following building, a parametric façade is adopted to the building and it is widely known for its architectural value and beauty as well as its cost reduction. This building used digital fabrication and the glass façade was digitally

⁶² Jeffries Adrienne. *Travelodge Hotel*. Photograph. Inhabitat. Web. 1 Nov. 2015.

generated in different sizes and shapes to create geometrical shapes. They were then mass produced and installed on-site.⁶³



Figure 20: The IAC New York Building by Gehry Associates, 2007.⁶⁴

4.1.3 TECHNOLOGY: DESIGN AND ASSEMBLY

4.1.3.1 COMPUTER AIDED DESIGN (CAD)

The possible shapes and sizes that can be produced through computer technology is almost endless. For instance, the simple CAD drawing as in Figure 17 can be realized in Figure 18.⁶⁵

⁶³ Piroozfar A.E. Poorang and Piller T. Frank, Mass Customisation and Personalisation in Architecture and Construction (London and New York: Routledge, 2013) 187.

⁶⁴ Springer. *IAC Building*. 2013. Photograph. Arch Linked. Web. 1 Nov. 2015.

⁶⁵ Piroozfar A.E. Poorang and Piller T. Frank, Mass Customisation and Personalisation in Architecture and Construction (London and New York: Routledge, 2013) 111-112.

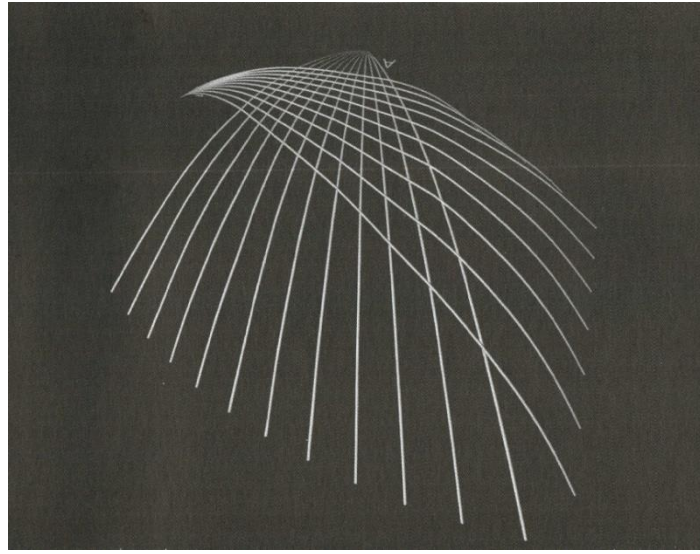


Figure 21: CAD drawing of bamboo grid shell.⁶⁶



Figure 22: The completed bamboo grid shell.⁶⁷

⁶⁶ Piroozfar A.E. Poorang and Piller T. Frank. *CAD drawings of the constructed 7 metre bamboo gridshell*. Photograph. *Mass Customisation and Personalisation in Architecture and Construction*. London and New York: Routledge, 2013. 111. Print

⁶⁷ Piroozfar A.E. Poorang and Piller T. Frank. *The completed bamboo gridshell*. Photograph. *Mass Customisation and Personalisation in Architecture and Construction*. London and New York: Routledge, 2013. 112. Print

4.1.3.2 TRUSSET AND CNC

The digital fabrication in architecture is being widely studied and practiced using various kinds of software. Table 8 illustrates the process of installing a truss which was designed using a software called Trusset (structural system) and then fabricated in CNC.

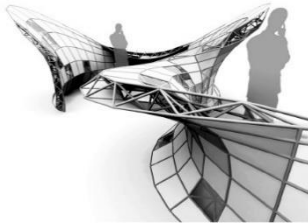
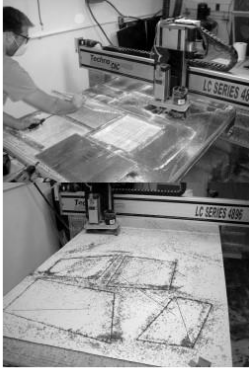
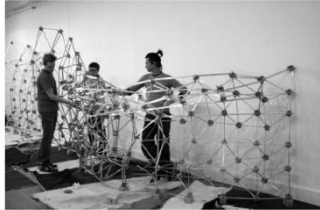
		
Design model	CNC fabrication	Assembly

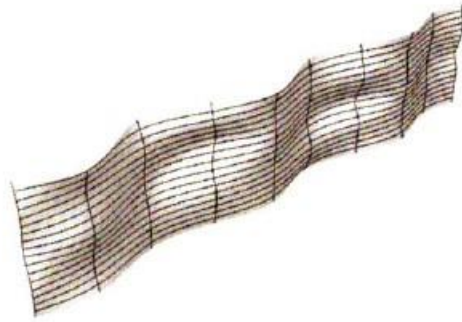
Table 8: Process of digital fabrication.⁶⁸

4.1.3.3 ARCHITECTURAL ROBOTICS

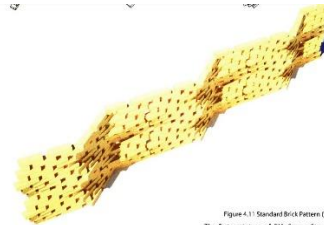
With the advantages of computer software such as CAD, CAM, and Grasshopper for architectural robotics, it is becoming easier and faster to design parametric shapes and implement them on the sites. For instance, the parametric design of a wall as in Figure 19. Can be assembled by a robot. It is also possible to create the customized brick pattern (CBP) by changing certain codes in the program for the standard brick pattern (SBP).

⁶⁸ Anzalone Phillip, et al., "Non-Uniform Assemblage: Mass Customization in Digital Fabrication," WITHOUT A HITCH: NEW DIRECTIONS IN PREFABRICATED ARCHITECTURE 2008: 298-306.

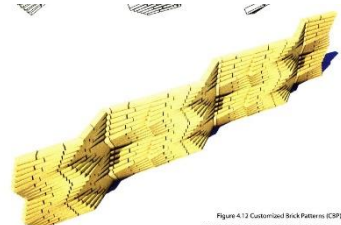
Stage 1. Design



(1) Parametric Design of Wall



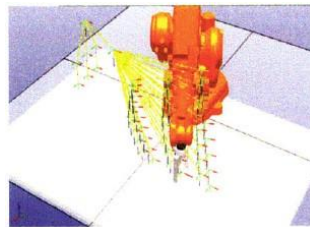
(2) Screen Structure of Standard Brick Pattern (SBP)



(3) Screen Structure of Customized Brick Pattern (CBP)



Stage 2. Simulation



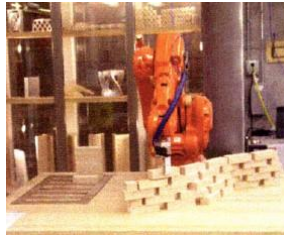
(4) Graphical Simulation



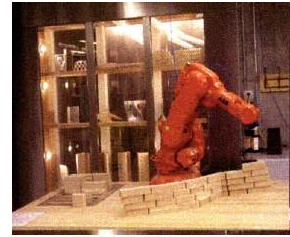
(5) Programming Simulation



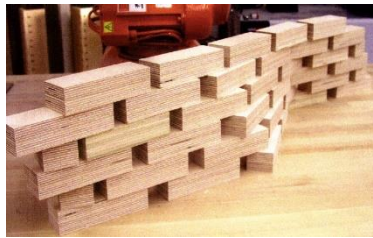
Stage 3. Assembly



(6) The automatic assembly process of SBP



(7) The automatic assembly process of CBP



(8) Standard Brick Pattern (SBP)



(9) Customized Brick Pattern (CBP)

Figure 23: Customized brick pattern.⁶⁹

4.1.3.4 3D PRINTING

The interest in printing out a full-scale house has been increased in many stockholders and architects in recent years. Regarding the issue, a group of Dutch architects has been attracting the public attention as they are experimenting on the 3D printer called Kamermaker, which can create large objects. The team is testing various materials such as bio-based materials and recycling plastic. The 3D printer can also be transported to different sites.⁷⁰

⁶⁹ Liu Yuchen, "Robotic Design Construction: Digital Fabrication Strategies for Freeform Masonry and Mobile Assembly," *Massachusetts Institute of Technology* June 2009: 30-59.

⁷⁰ DUS Architects, "Karmaker: 3D printer in Amsterdam," 2015 <<http://3dprintcanalhouse.com/>>.



Figure 24: Karmemaker: 3D printer in Amsterdam.



Figure 25: 3D printing process inside Karmemaker.⁷¹

4.1.3.5 CONTOUR CRAFTING

Another technique used of a full-scale house printing is called contour printing invented by Khoshnevis of the University of Southern California. According to Khoshnevis (2012), a customized 2,500 sq foot house can be built in about 20 hours with concrete.

⁷¹ Wainwrightin. *Work begins on the world's first 3d-printed house*. 2014. Digital image. Web. 13 Dec. 2015.

Also, while building a basic structure, plumbing and electrical networking installation is also possible. Moreover, based on computerized designs the shapes of the house can be vary in many different ways including curves.⁷²

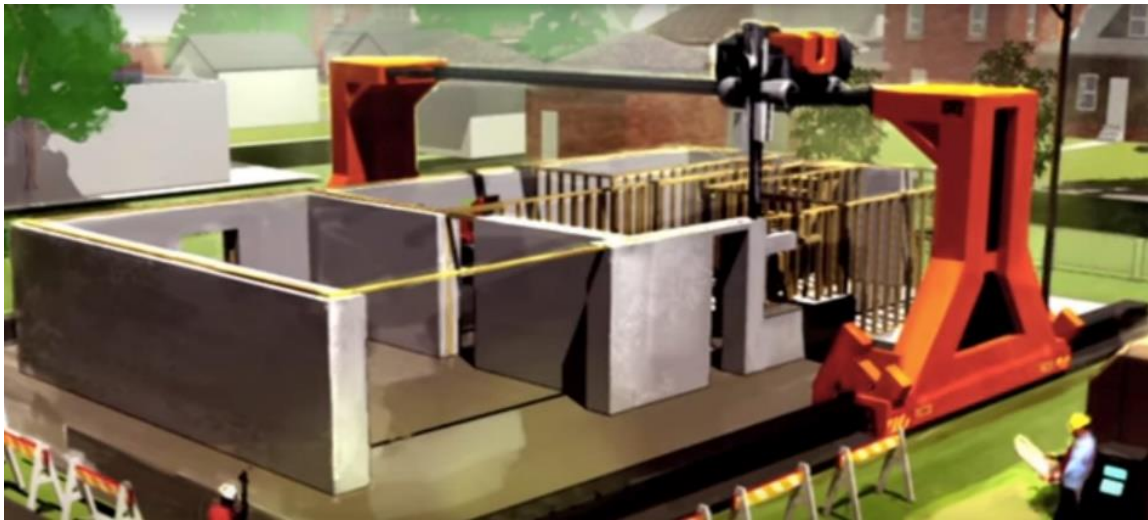


Figure 26: Contour Printing.

4.1.4 PERSONALIZATION

As an architect, when it comes to designing a house for individuals, understanding what an individual want should be a priority. In order to satisfy customers, it is important to interact with them in an efficient way. The mass customization system may lead to successful architectural communication with the help of technology. A recent case study by Belinda⁷³ attempts to identify the proper tools to be used when interacting with

⁷² Behrokh Khoshnevis, 2012 <<http://tedxtalks.ted.com/video/TEDxOjai-Behrokh-Khoshnevis-Con>>.

⁷³ Torus Belinda, “Learning from Vernacular Turkish House: Designing Mass-Customized Houses in Mardin,” *Intercultural Understanding*, vol.1, 2011: 105-112.

customers while designing mass customized houses. The study first identified architectural problems in Mardin as follows:⁷⁴

1. New houses in Mardin lack environmental, contemporary values, culture and social development.
2. Local materials are not used and air conditioning and acclimatization is solved artificially.
3. The cultural texture of the city is affected negatively.

The following images demonstrate the changes in buildings from traditional houses to modern apartments in Mardin.

	
<p>Traditional buildings in Mardin⁷⁵</p>	<p>New apartment blocks in Mardin⁷⁶</p>

Table 9: New houses in traditional settlements.

⁷⁴ Torus Belinda, "Learning from Vernacular Turkish House: Designing Mass-Customized Houses in Mardin," *Intercultural Understanding*, vol.1, 2011: 105-112.

⁷⁵ Torus Belinda. *Mardin*. 2005. Photograph. Learning from Vernacular Turkish House: Designing Mass-Customized Houses in Mardin. *Intercultural Understanding*, vol.1, 2011. 108. Print

⁷⁶ Torus Belinda. *New apartment blocks in Mardin*. 2005. Photograph. Learning from Vernacular Turkish House: Designing Mass-Customized Houses in Mardin. *Intercultural Understanding*, vol.1, 2011. 108. Print

In this study, the use of Plan Layout Generator (PLG) is introduced as a tool to present different plan layouts within certain limitations. Using PLG only four parameters are asked to the user such as the dimension of the site, the number of floors and the number of rooms. The design can be further articulated into 3D as illustrated in Table 10.

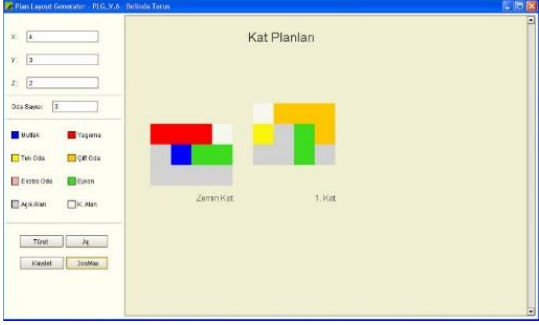
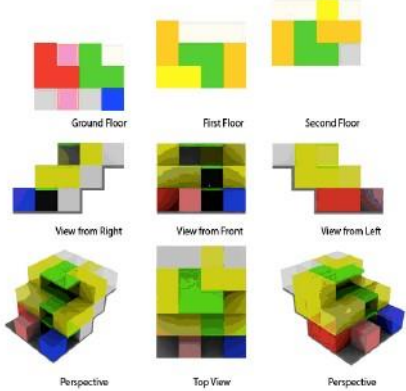
	
Interface of PLG ⁷⁷	Further articulation of design ⁷⁸

Table 10: Design articulation using PLG.

⁷⁷ Torus Belinda. *Interface of the program PLG*. 2008. Photograph. Learning from Vernacular Turkish House: Designing Mass-Customized Houses in Mardin. Intercultural Understanding, vol.1, 2011. 111. Print

⁷⁸ Torus Belinda. *Different views of a generated solution*. 2005. Photograph. Learning from Vernacular Turkish House: Designing Mass-Customized Houses in Mardin. Intercultural Understanding, vol.1, 2011. 108. Print

A more detailed design can be also executed and presented to customers as in Figure 23.

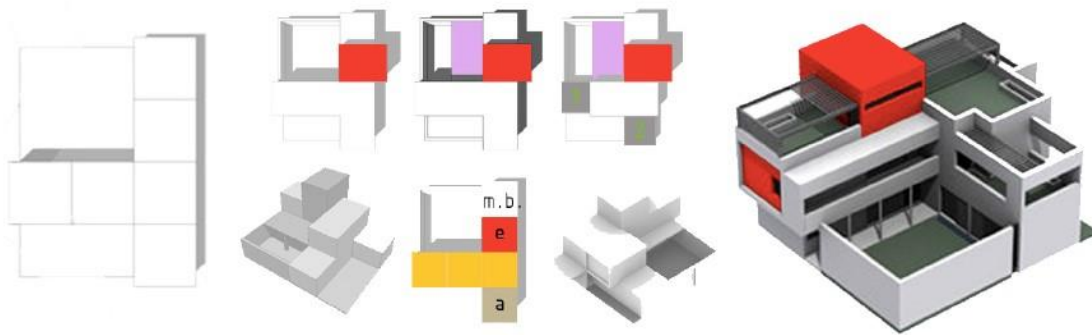


Figure 27: Detailed image of design⁷⁹

⁷⁹ Torus Belinda. *Design of a house, from plan layout to detailed three dimensional model*. 2008. Photograph. Learning from Vernacular Turkish House: Designing Mass-Customized Houses in Mardin. Intercultural Understanding, vol.1, 2011. 111. Print

Chapter 5: Case Studies

5.1 INTRODUCTION

In this section four case studies are presented and presented from the viewpoint of incorporating modern standards with traditional homes to create a viable residence for modern residents, while maintaining the *Chojip* identity. The case studies are analyzed one at a time, and within each case study, aspects of the design are singled out as relevant for the current project. These four case studies are the Blind Whale, Jeju Ball, *Podo* Hotel, and Yusuhara Marche buildings. At the end of this section, the four case studies will be summed up and incorporated into a single theme based on inspirations from the case studies.

5.2 CASE STUDY 1: BLIND WHALE

- Architects: Z-Lab
- Location: Jeju-si, Jeju-do, South Korea
- Architects in Charge: Lee Sang-muk, Noh Kyung-rok and Park Jung-hyun
- Area: 100 square meters
- Project Year: 2014
- Photographs: Kim Jae-kyeong
- Furniture Design: Matter & Matter
- Lighting Design: Limas
- Construction: Zinyong Construction

5.2.1 ABOUT BLIND WHALE

Blind whale is not a new construction. Rather, Z_Lab renovated an already existing *Chojip*, adding modern upgrades to the existing structure, incorporating modern tastes to the interior design, and doing slight structural upgrades. Because of this, the building maintains a rather traditional feel, while addressing many concerns that modern residents seem to have about living in *Chojip*.



Figure 28: Blind Whale exterior wall.⁸⁰

In the above picture, an original exterior border wall can be seen which utilizes volcanic stone. The entrance is more modern, although there does not seem to be a modern fully closable gate. From outside of the property, the entire building remains quite

⁸⁰ Blind Whale / Z_Lab. 28 Sep 2015. Photograph. Arch Daily. Web. 1 Oct 2016. Accessed.

traditional, with few modern upgrades, with the exception of the non-thatched roof, visible from this vantage point. While the roof is not thatched, it uses steel panel construction while maintaining the shape of a traditional thatched roof, which preserves most of the original exterior aesthetic.



Figure 29: Blind Whale building exterior from courtyard.⁸¹

⁸¹ Blind Whale / Z_Lab. 28 Sep 2015. Photograph. Arch Daily. Web. 1 Oct 2016. Accessed.

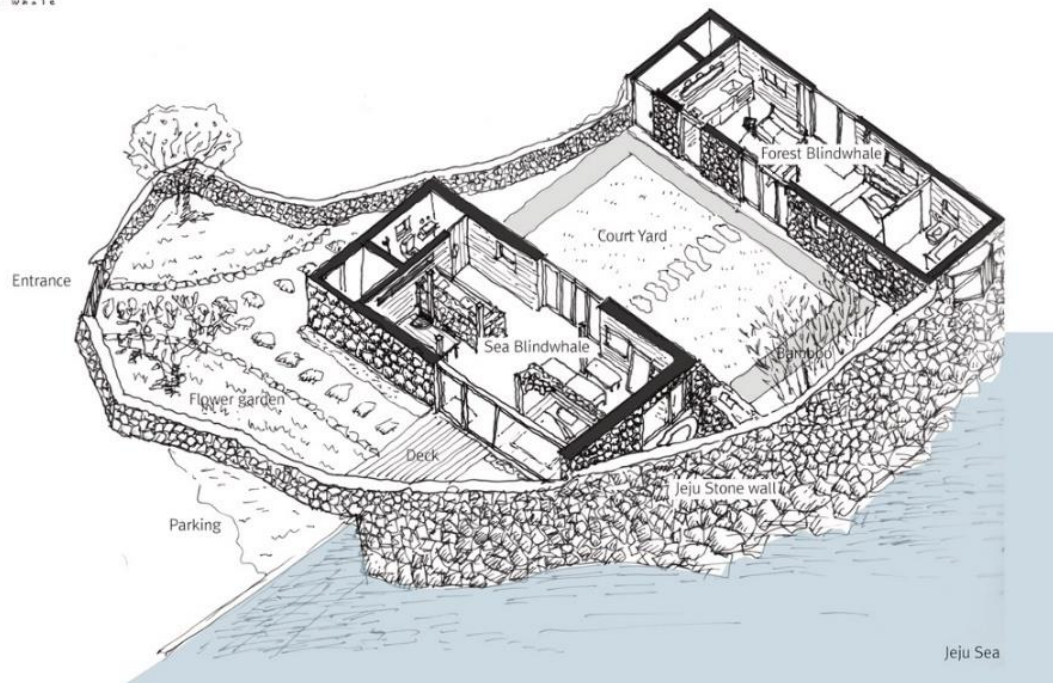


Figure 30: Blind Whale lot plan.⁸²

The Blind Whale consists of two buildings, separated by a courtyard with a small volcanic stone path linking the two. *Chojip* traditionally consist of multiple buildings, including separate constructions for kitchens and bathrooms. The modernized *Chojip* here maintains the multiple building tradition, but moves the Bathroom and kitchen indoors.

⁸² Blind Whale / Z_Lab. 28 Sep 2015. Photograph. Arch Daily. Web. 1 Oct 2016. Accessed.



Figure 31: Blind Whale interior.⁸³



Figure 32: Blind Whale interior with sleeping area view.⁸⁴

⁸³ Blind Whale / Z_Lab. 28 Sep 2015. Photograph. Arch Daily. Web. 1 Oct 2016. Accessed.

⁸⁴ Ibid.

While the exterior maintains a mostly traditional appearance, the interior has been completely renovated, with modern straight lines and smooth textures integrated into the *Chojip*, while maintaining traditional accents, like natural wood and rough stone next to smooth metal, polished stone, concrete flooring (finished with epoxy) and rectangular brick. All of the original walls have been removed, leaving only exterior walls, yet the indoor space is divided into several areas through volcanic stone partitions, newly constructed brick walls in some areas (the bedroom, for example, while not completely walled in, has a single modern brick wall which provides a level of privacy), and elevation changes.

The Blind Whale exemplifies the idea of preservation through adaptation. Rather than tearing down the original *Chojip* to make room for a modern construction, the *Chojip* was salvaged by upgrading its interior and aspects of its design. The architects have successfully preserved this original *Chojip*, not through creating a relic of the past, but by bringing the past into modernity.

5.3 CASE STUDY 2: JEJU BALL

- Architects: Kengo Kuma
- Location: Jeju-si, Jeju-do, South Korea
- Area: 210-245 square meters
- Project Year: 2014
- Photographs: Kengo Kuma and associates

5.3.1 ABOUT JEJU BALL

Jeju Ball is part of a larger resort, with 4 blocks designed by separate architects. Lot D, which is the focus of this case study, was designed by Japanese architect Kengo Kuma. The buildings are new constructions, but maintain many features of more traditional *Chojip*, particularly in the shape and materials used in the roofing. Japanese influences are also found in Jeju Ball, to be discussed in more detail below.



Figure 33: Jeju Ball aerial view.⁸⁵

⁸⁵ Kengo Kuma designs Jeju Ball for art villa complex in Korea. 06 Jun 2013. Photograph. Designboom. Web. 1 Oct 2016. Accessed.



Figure 34: Jeju Ball roof material detail.⁸⁶

The above pictures show both a total view and detailed view of the roofs. As Kengo Kuma states “When I visited Jeju Island for the first time, I was so much inspired by this dark, porous volcanic rock and wanted to translate its soft and round touch into architecture.” As can be seen the two photographs, the volcanic stone plays a fairly integral part of the roof. The shape of the buildings, with rounded rooftops, resemble both the traditional shape of *Chojip* and the shape of the many volcanic cones which are found throughout the island. The top picture particularly displays the use of volcanic stone in a traditional way, with border fences that are also made of this material. Although

⁸⁶ Kengo Kuma designs Jeju Ball for art villa complex in Korea. 06 Jun 2013. Photograph. Designboom. Web. 1 Oct 2016. Accessed.

traditionally volcanic stones were only used in the construction of walls and fences, Kuma has integrated them directly into the roofs of the buildings. The result is rather striking, and does a good job of capturing the spirit of Jeju as a volcanic island, and incorporating it into a structure in a novel way.



Figure 35: Jeju Ball interior sleeping area.⁸⁷

⁸⁷ Kengo Kuma designs Jeju Ball for art villa complex in Korea. 06 Jun 2013. Photograph. Designboom. Web. 1 Oct 2016. Accessed.



Figure 36: Jeju Ball interior, common area.⁸⁸

The two above pictures contrast greatly with the traditional, Jeju-inspired design of the buildings' exteriors. The interior design has quite a large amount of Japanese influence, particularly in the use of bamboo in designing the interior structures, crossed-bamboo patterning on the ceiling, and a particular feeling of a more classic "Japanese minimalist" approach are areas of concern when designing a modern *Chojip*. Jeju interior influences would better serve the purposes of the current project.

Overall, the exterior of Jeju Ball offers many considerations for the current project, especially the shape of the roofs and the novel approach to the incorporation of volcanic

⁸⁸ Kengo Kuma designs Jeju Ball for art villa complex in Korea. 06 Jun 2013. Photograph. Designboom. Web. 1 Oct 2016. Accessed.

stones. The interior provides less inspiration, as it draws rather heavily from Japanese interior design traditions.

5.4 CASE STUDY 3: *PODO* HOTEL

- Architects: Itami Jun
- Location: Seogwipo-si, Jeju-do, South Korea
- Project Year: 2001
- Photographs: Podo Hotel

5.4.1 ABOUT *PODO* HOTEL

Podo (which means ‘grapes’) is a new construction build at the request of a golf course, as a high-end hotel. Like the other buildings, design cues were taken from the natural environment, which is dominated by volcanic rocks, soil, and dome shaped volcanic domes. As a hotel with 26 rooms, this building is larger than the other case studies. The rooms are all single-floor, and as such the hotel is spread over a large area, with minimal vertical presence.



Figure 37: *Podo* hotel aerial view.⁸⁹

The above picture captures rather nicely the most striking feature of *Podo* hotel, i.e. its fluid-shaped dome roof which stretches across the entire structure. The shape of the roof is said to resemble grapes, hence the name of the building, *Podo*, or ‘grape’, hotel. The roof, however, also resembles in many ways the traditional dome shape of thatched *Chojip* roofs, and if one compares the shape of the roof in the foreground to the volcanic cones in the background, there is an obvious incorporation of Jeju’s volcanic environment into the roof. The building does not stand out in its surroundings, as it has a low vertical footprint and mimics the natural shapes around it. From a design standpoint, it captures quite nicely the idea of blending the natural and the man-made.

⁸⁹ The last paper architect. 30 Mar 2010. Photograph. The Jeju Weekly. Web. 28 Sep 2016. Accessed.



Figure 38: *Podo* hotel landscape design with volcanic stone.⁹⁰

The above photograph was included to highlight the use of volcanic stones in the landscape design, as well as the choice of dark wood exterior walls instead of the more traditional volcanic stone walls for the buildings themselves. In the center of the photograph, one can see a traditional gate, with three horizontal bamboo poles delineating a boundary on the property. This gate especially invokes a sense of traditional Jeju, and is a well-known feature of *Chojip* (although many of the respondents to the survey, as discussed earlier, see this gate as more of a security risk than anything else).

The overall design of *Podo* hotel blends Japanese and Korean influences, perhaps unsurprisingly so, as the architect is an ethnic Korean who was born in Japan. The use of wood, particularly in the doors, walls, and certain interior settings is quite Japanese. The

⁹⁰ The last paper architect. 30 Mar 2010. Photograph. The Jeju Weekly. Web. 28 Sep 2016. Accessed.

interior does make use of exposed wooden rafters against a white ceiling, which is of Korean and Jeju origin. The roof shape, setting, and Jeju influence in design are well executed, while the Japanese elements add a taste of the architects origins, though do not necessarily influence the current project.

5.5 CASE STUDY 4: YUSUHARA MARCHE

- Architects: Kengo Kuma & Associates
- Location: 1196-1 Yusuhara, Yusihar-Cho, Takaoka-gun, Koch, Japan
- Client: Tomio Yano, Town Mayor of Yusuhara
- Site: 779.08 square meters
- Area: 552.28 square meters
- Photographs: Takumi Ota Photography

5.5.1 ABOUT YUSUHARA MARCHE

The truly outstanding feature of this building is the use of straw. As the photographs below illustrate, the architects made use of a traditional material in new and innovative ways which make its upkeep and lifespan more suitable to modern needs, where people do not expect to replace parts of their homes for quite a long time.



Figure 39: Yusu-hara Marche in a natural environment.⁹¹

In a natural setting, the natural straw siding of the building is particularly stunning. The building does not stand out, despite its uniqueness among the other buildings in the above photograph. It complements the green of the forest, and the beauty of the mountains with natural straw materials and colors. Visually, the building is superb in its use of traditional materials and its placement in the natural environment.

⁹¹ Bridgette Meinhold. Yusu-hara Marche is a Thatch-Covered Market & Boutique Hotel in Japan. 10 Mar 2012. Photograph. Inhabitat. Web. 25 Sep 2016. Accessed.



Figure 40: Yusuhara Marche exterior wall with roof overhang and thatched straw siding.⁹²

In a traditional thatched roof, the straws primary function is to protect the building from the elements, sunshine, precipitation, and temperature variations. In the first photograph one can see that the roof is quite modern, and in the immediate above photograph, the straw is used as a curtain wall, rather than as the primary rooftop. This arrangement accomplished two things, 1) it helps the natural material last longer, as it is not the main defender against the elements, and 2) it incorporates traditional materials and building practices into the modern building, bridging the gap between tradition and modern demands. The deep overhanging roof adds a level of protection for the straw against rain.

⁹² Bridgette Meinhold. Yusuhara Marche is a Thatch-Covered Market & Boutique Hotel in Japan. 10 Mar 2012. Photograph. Inhabitat. Web. 25 Sep 2016. Accessed.



Figure 41: Yusuhara Marche straw thatch detail.⁹³

This photograph details further the straw curtain system. The cut end of the straw faces downward, which minimizes the effect of water on the straw. Additionally, the thatch straw is arranged in bundles which rest on a rotating base. Each bundle can rotate upwards, which allows fresh air to ventilate the underside of the straw. This innovative design minimizes the effect of mold and mildew on the straw, and greatly expands its lifespan.

⁹³ Bridgette Meinhold. Yusuhara Marche is a Thatch-Covered Market & Boutique Hotel in Japan. 10 Mar 2012. Photograph. Inhabitat. Web. 25 Sep 2016. Accessed.

5.6 CONCLUSION

The four case studies make use of traditional influences, designs, and materials to varying degrees, but the common thread through all of them is blending Modern and traditional. The Blind Whale maintains the traditional look of *Chojip* by renovating an existing structure with modern interior design and materials. The Jeju Ball hotel utilizes traditional volcanic stone in a novel way, by incorporating it into the roof, and in some cases, bringing the roof down to the ground in a volcanic stone curtain. The *Podo* Hotel is quite modern, with Japanese inspired interior design. However, its use of a single roof with curved edges and multiple cones which imitate the volcanic cone structures found on Jeju both blends the building into its natural surroundings and pays tribute to the curved roofs of *Chojip*. Finally, Yusuvara Marche incorporates straw thatch into a modern building in a very unique way. Rather than having thatch be the main roofing material, the thatch is fixed on the exterior walls, and is protected from the elements by a large roof overhang, and by new techniques which protect the straw from deteriorating.

Chapter 6: Survey Analysis: Jeju People's Attitude Towards Jeju *Chojip*

6.1 INTRODUCTION

In order to make this project as relevant as possible for the local populations, and to understand what modern residents of Jeju expect in a modern *Chojip*, a survey of 24 questions was conducted in Jeju City and *Seoquipo* City, the two biggest cities on Jeju Island. 102 individuals, 65 male and 37 female, completed the survey. Six of the 24 questions were demographic, so 18 of the questions (questions 7-24) regarded the respondent's opinions of both traditional *Chojip* and modern homes. The questions tried to determine respondents opinions on *Chojip*, their willingness to live in *Chojip*, which parts of *Chojip* are most revered and should be preserved, and which parts of *Chojip* should be modernized. Questions seven through 13 and 16 through 23 were ranked opinion questions, where a statement was given, and the respondents were given a choice between strongly agree, agree, neutral, disagree, and strongly disagree. The specific ranked choice questions are listed below:

- 7. *Chojip* is practical
- 8. *Chojip* is beautiful
- 9. *Chojip* is environmentally friendly
- 10. *Chojip* represents Jeju culture and history
- 11. *Chojip* should be preserved
- 12. I want to live in a *Chojip*
- 13. If *Chojip* were modernized I may live there

- 16. Jeju modern houses are practical
- 17. Jeju modern houses are beautiful
- 18. Jeju modern houses are environmentally friendly
- 19. Jeju modern houses represent Jeju culture and history
- 20. Jeju modern houses are distinctively different from other regions
- 21. Jeju modern houses should be promoted continually
- 22. Modern houses should be more westernized
- 23. Modern houses should adopt spaces, features, and materials of a thatched-roof house to some degree

Questions 14 and 15 asked respondents to indicate which spaces, features, and materials of *Chojip* should be preserved, and which should be adopted into modern houses. A list of several aspects of *Chojip* were given, and the Respondent could choose as many as wanted. These choices were:

Kitchen, dining room, bedroom, living room, patios and decks, storeroom, heating space, ceiling, roof, external walls, gate, doors and windows, blinds, stone fence, vegetable garden, narrow path to the house, toilets, yard, volcanic stones, thatch, wood, soil, paper.

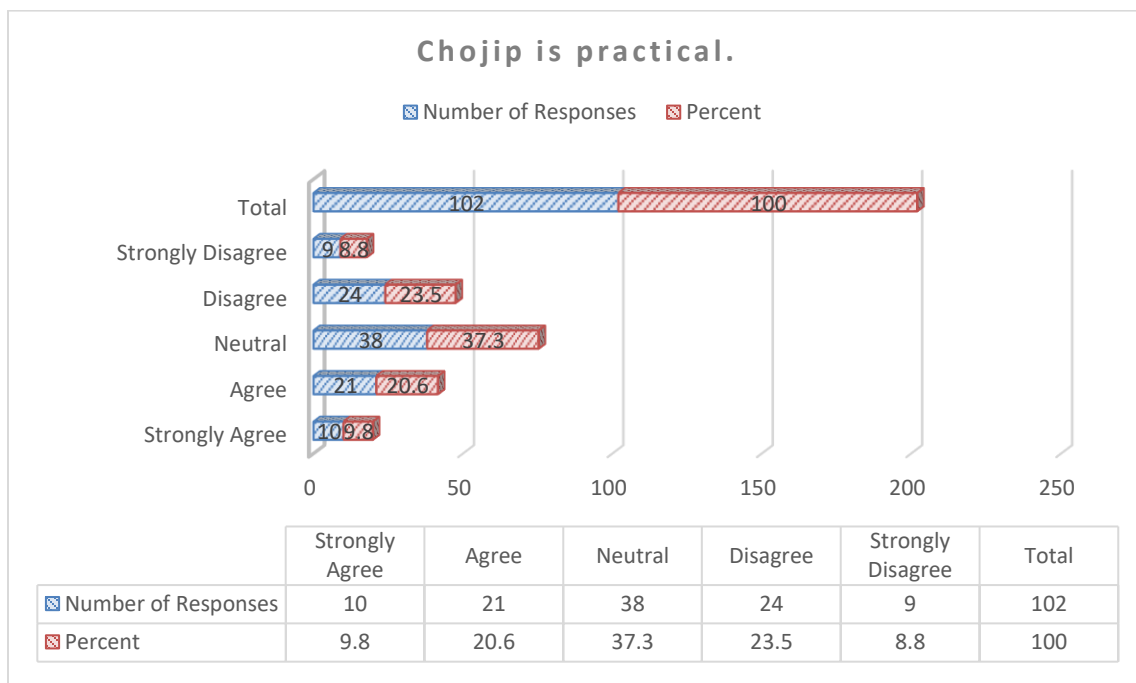
Question 24 was open ended and asked respondents to offer their opinions on what should be considered in order to improve *Chojip*.

The responses to all of these questions are summarized in this chapter, and they will play an integral part in designing a modern *Chojip* which is not only a symbol of Jeju culture, but also a viable place of residence for modern residents of Jeju island.

6.2 SURVEY RESULTS REGARDING *CHOJIP*

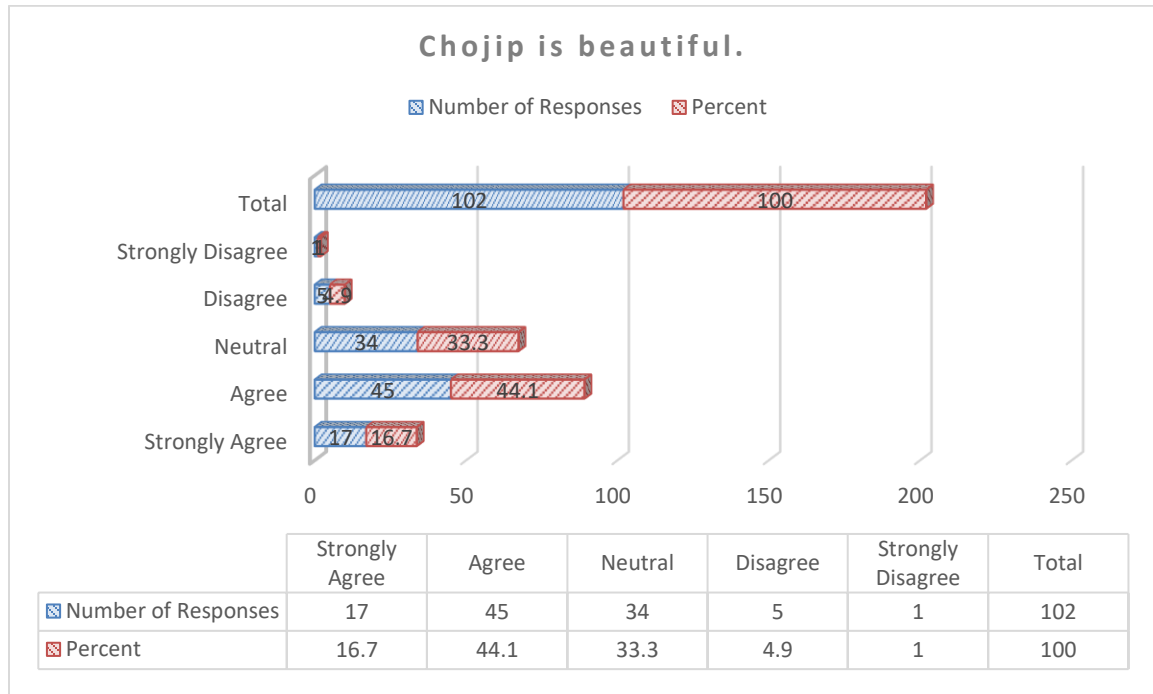
In this section the responses to ranked choice questions regarding *Chojip* (questions 7 through 13) are given in bar graphs. The graphs show what percentages strongly agreed, agreed, were neutral, disagreed, and strongly disagreed with the supposition posed in the question. A short discussion of the responses follows each graph. The short discussions attempt to interpret the individual responses, while a more general discussion of the whole survey is given at the end of the section.

6.2.1 QUESTION 7



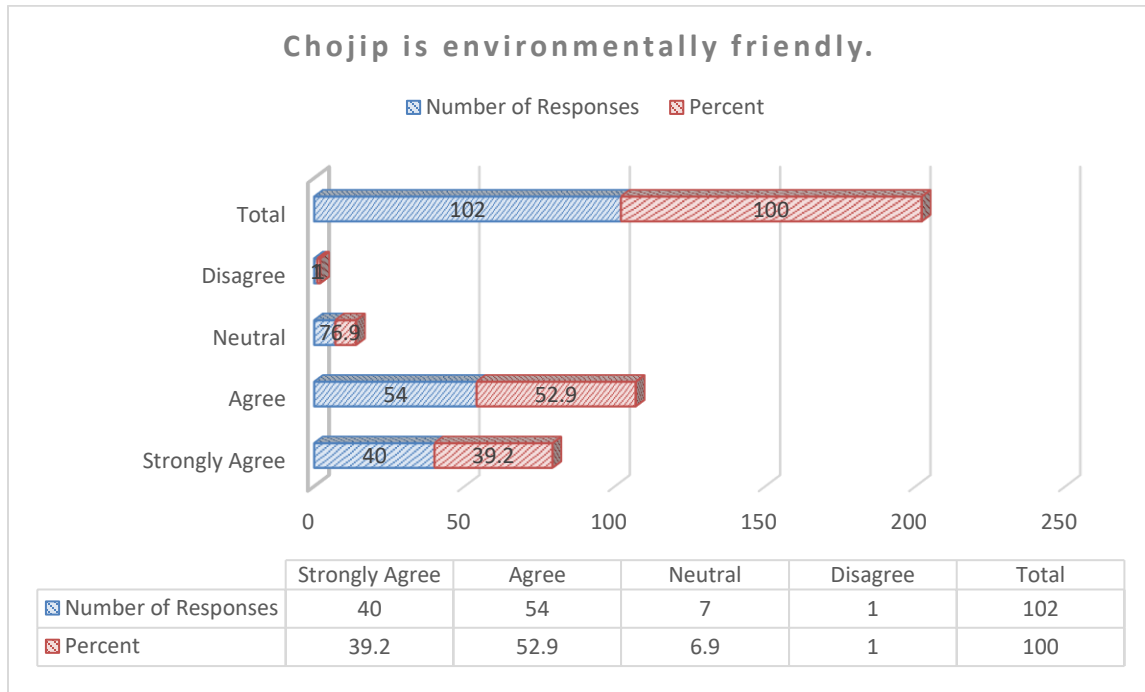
The majority of responders did not have strong opinions on the practicality of *Chojip*. Practicality will thus likely have little impact on planning. That is, changes will not need to be made to address practicality.

6.2.2 QUESTION 8



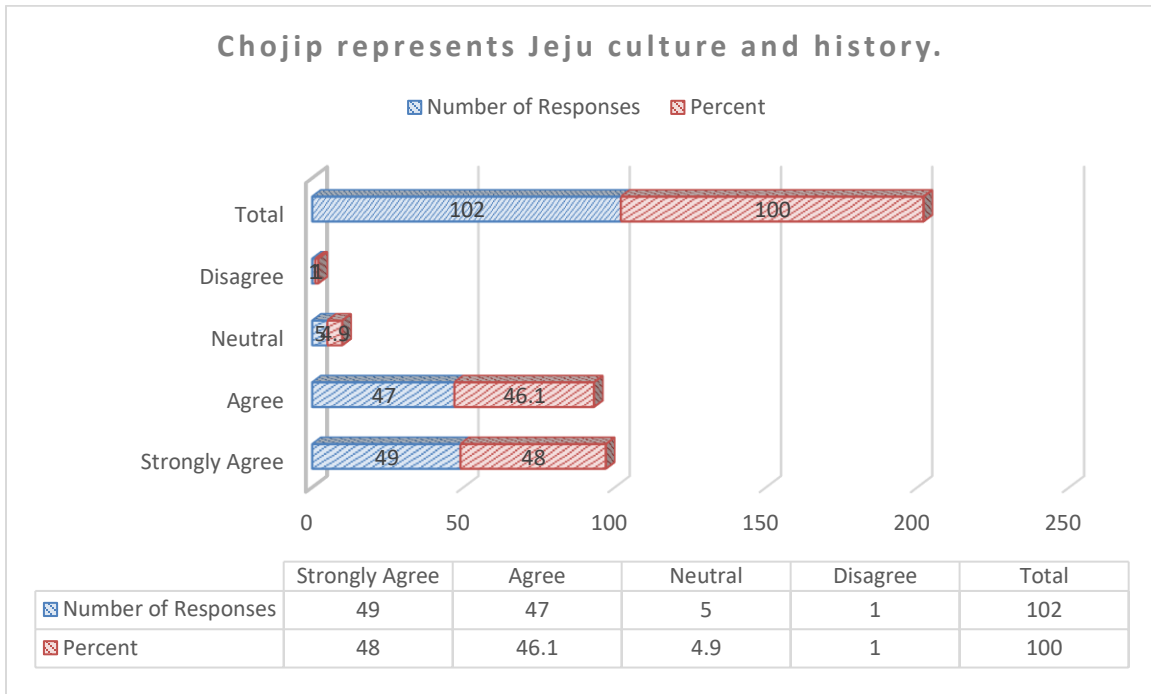
The majority of respondents agree that *Chojip* is beautiful. It will be necessary to address the traditional aesthetics of *Chojip*, and preserve them in modern adaptations. This is particularly relevant when choosing whether to upgrade and modernize purely aesthetic aspects of the *Chojip*. It will likely be necessary to change the aesthetics, appearance, and materials of *Chojip* as little as possible.

6.2.3 QUESTION 9



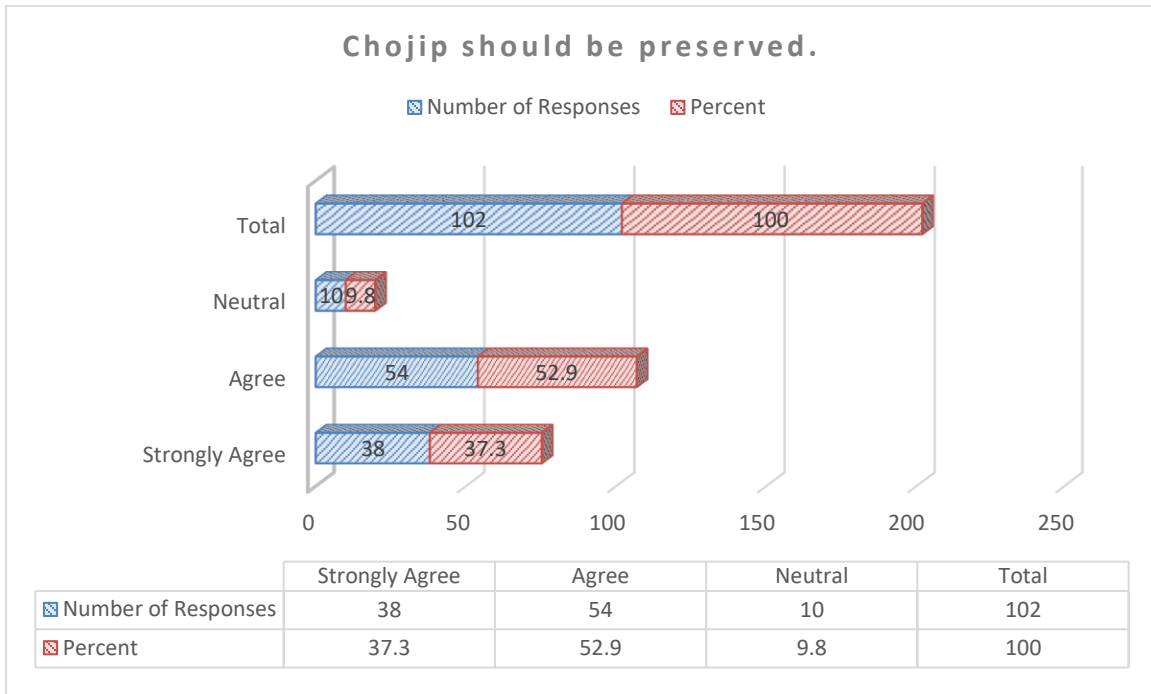
Again, respondents agree that *Chojip* is already environmentally friendly. Modern adaptations of *Chojip* should thus attempt to maintain the traditional materials which make *Chojip* environmentally friendly, while incorporation modern sustainability where possible.

6.2.4 QUESTION 10



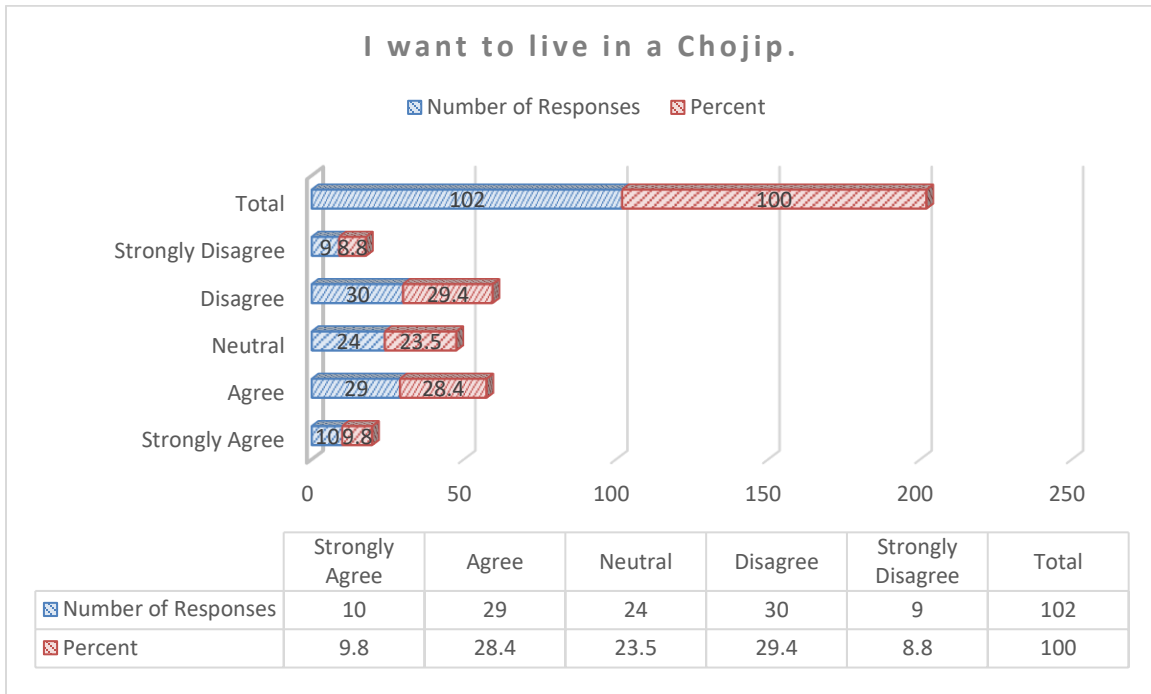
Obviously, building *Chojip* will rely heavily on preserving a sense of culture within the larger community, and it will be necessary to maintain those aspects of *Chojip* which are especially beloved by the local population.

6.2.5 QUESTION 11



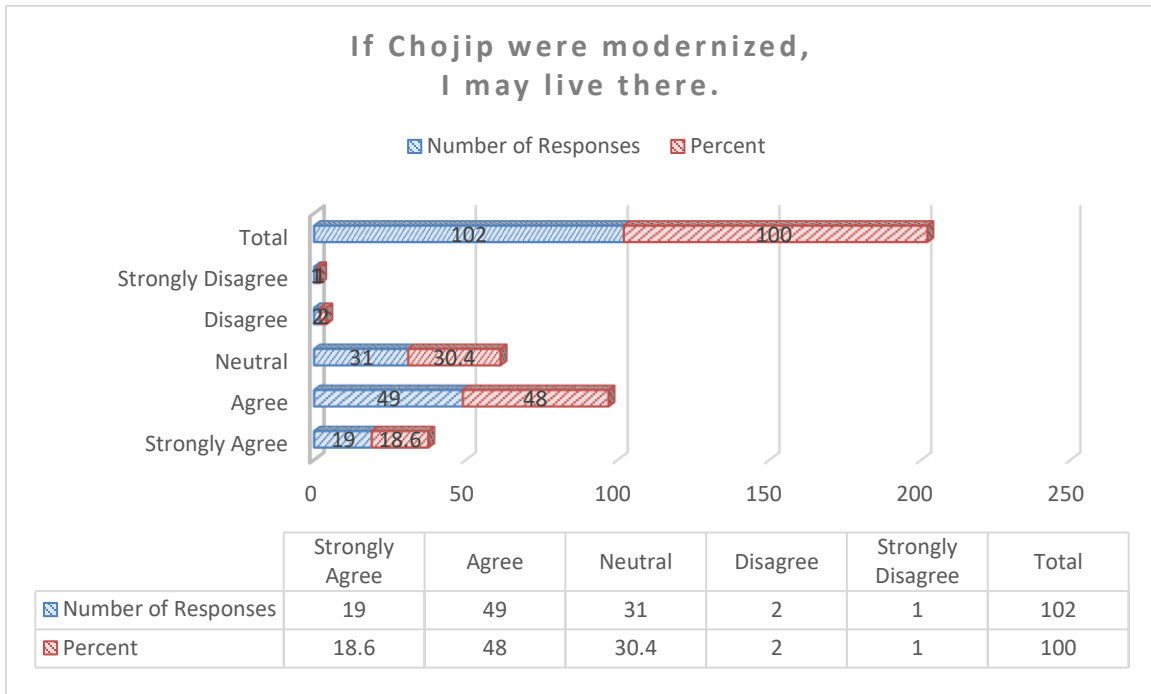
Because many *Chojip* have already been demolished, building new *Chojip* is the first step towards preserving the *Chojip* as a practical means of residence. What *Chojip* remain should be preserved, but the best way to preserve *Chojip* as a part of life is to incorporate *Chojip* into modern constructions.

6.2.6 QUESTION 12



This question seems to have split the respondents. It is reassuring, however, that more than a third of respondents indicate a desire to live in a *Chojip*. The market for modern *Chojip* seems to be present, which is good for promoting the *Chojip* as a viable place of residence rather than as a museum piece or artifact of the past.

6.2.7 QUESTION 13



With the previous question in mind, this graph shows even more clearly the possibilities of a large marked for “modernized” *Chojip*, with two-thirds of respondents willing to live in a *Chojip*, as long as it is equipped with modern amenities.

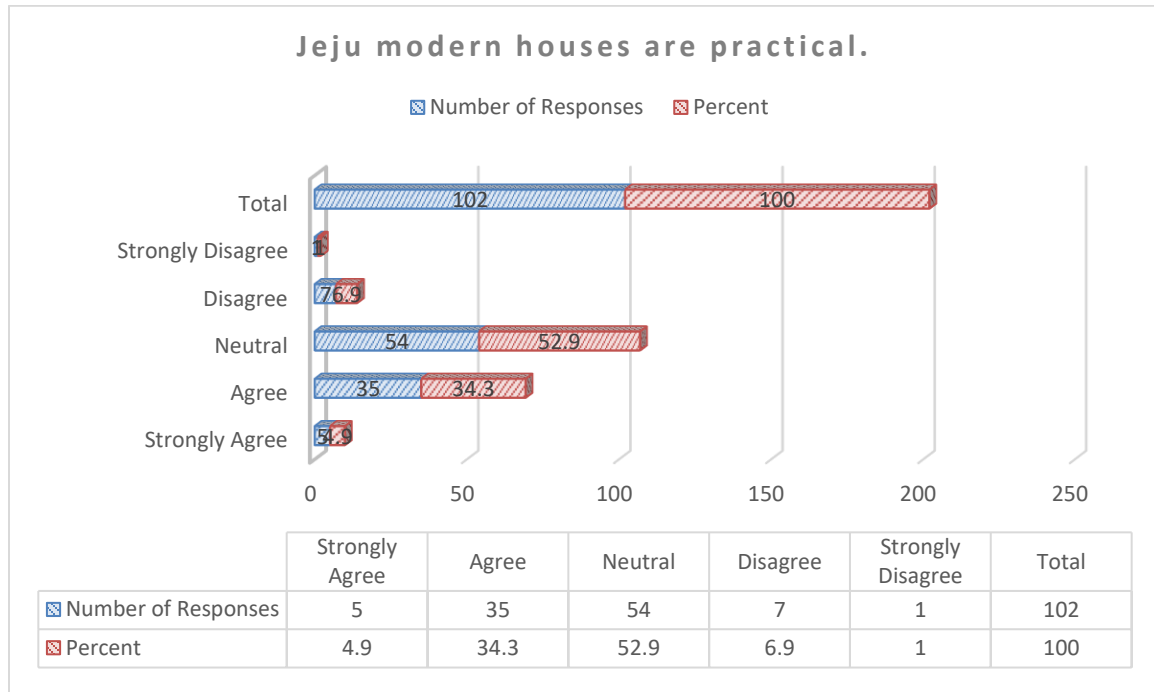
6.2.8 SUMMARY OF RANKED CHOICE RESPONSES CONCERNING *CHOJIP*

With regard to Jeju people's attitudes of *Chojip*, two trends can be extracted from the responses. First, *Chojip* are still considered to be an important part of Jeju culture and history. Respondents see a need to preserve *Chojip* as a part of Jeju, and the *Chojip* are seen as beautiful, important, and worth protecting. Secondly, respondents also see a need to modernize *Chojip*, to make them appeal more to modern residents. The *Chojip* are not seen as particularly practical, nor do a majority of respondents have any desire to live in a *Chojip*. However, if the *Chojip* is modernized, opinions change rather drastically, and respondents are much more willing to live in a *Chojip* that meets a modern standard of living.

6.3 SURVEY RESPONSES REGARDING MODERN HOMES IN JEJU

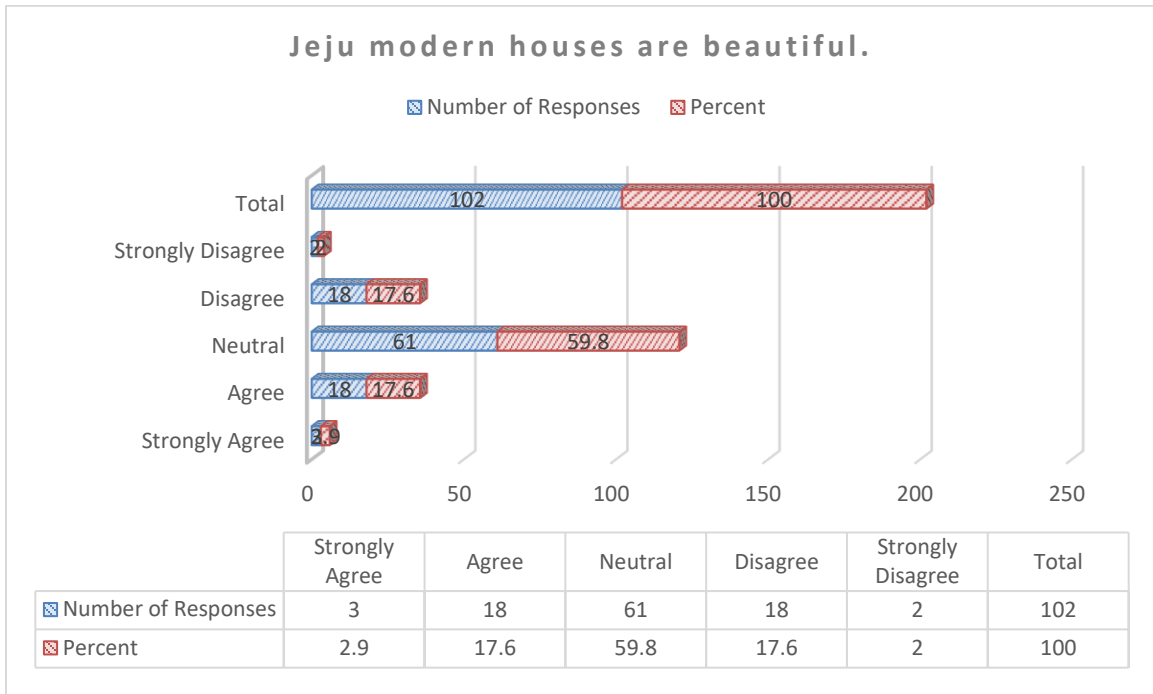
In this section the responses to ranked choice questions regarding modern homes in Jeju (questions 16 through 23) are given in bar graphs. The graphs show what percentages strongly agreed, agreed, were neutral, disagreed, and strongly disagreed with the supposition posed in the question. A short discussion of the responses follows each graph. The short discussions attempt to interpret the individual responses, while a more general discussion of the whole survey is given at the end of the section.

6.3.1 QUESTION 16



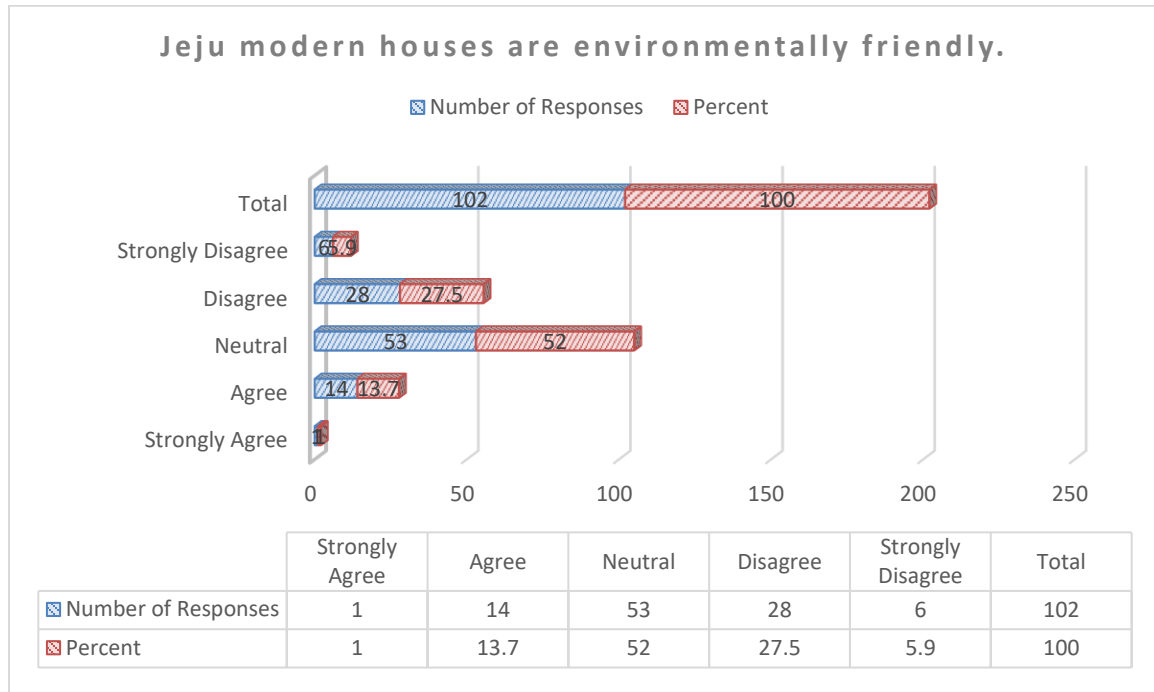
As with the *Chojip*, respondents have mostly neutral opinions on the practicality of modern homes. Note, however, that there is a much lower portion of the respondents who disagreed with the supposition that “modern homes are practical”. This may show that practicality can play a role in reinvigorating *Chojip* in Jeju. Modernizing *Chojip* will almost certainly make them seem more practical.

6.3.2 QUESTION 17



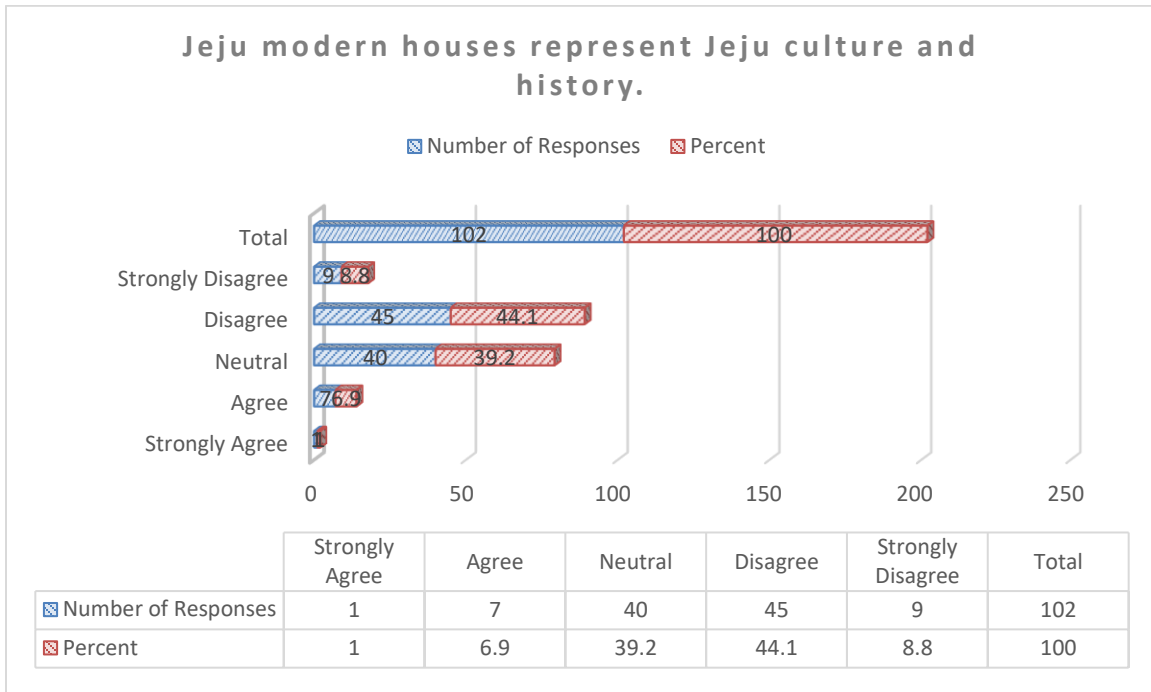
Respondents were generally unimpressed with the beauty of modern homes, in stark contrast to their opinions of *Chojip*, which are seen as beautiful by the majority of respondents. Fewer than a third of respondents agree or strongly agree that modern homes are beautiful.

6.3.3 QUESTION 18



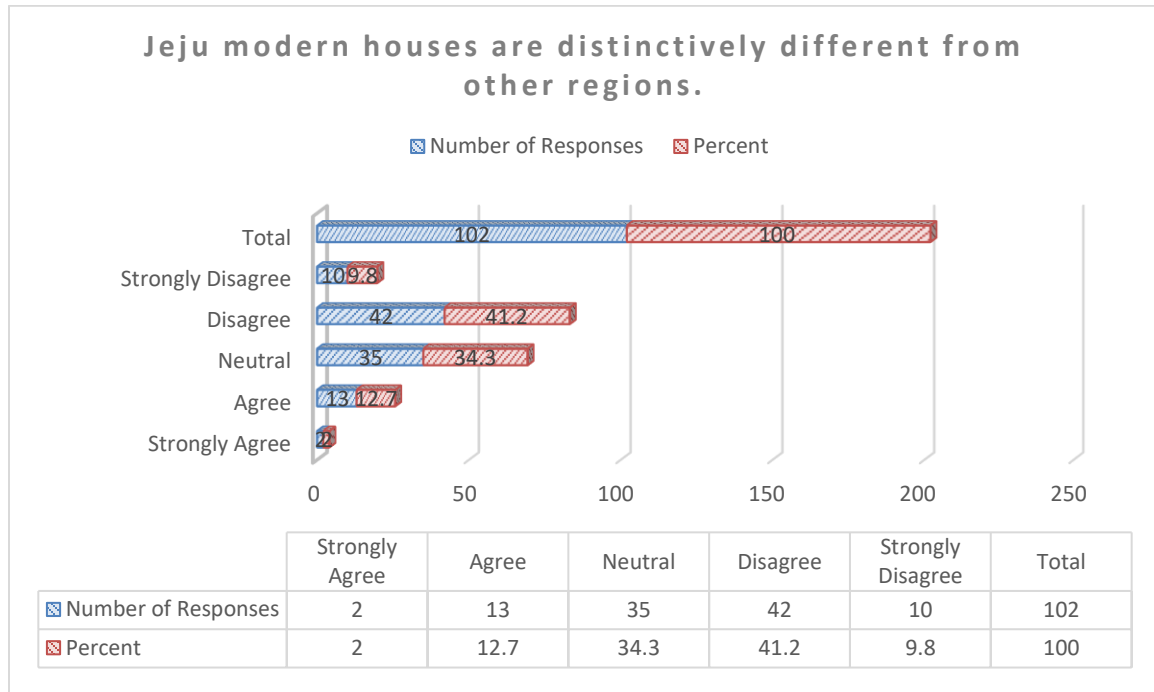
Generally, respondents were neutral as to whether modern homes are environmentally friendly. This is a rather stark contrast to *Chojip*, which are overwhelmingly seen as environmentally friendly by respondents. More respondents disagreed with the supposition that modern homes are environmentally friendly, roughly double the number of respondents disagreed compared to those who agreed.

6.3.4 QUESTION 19



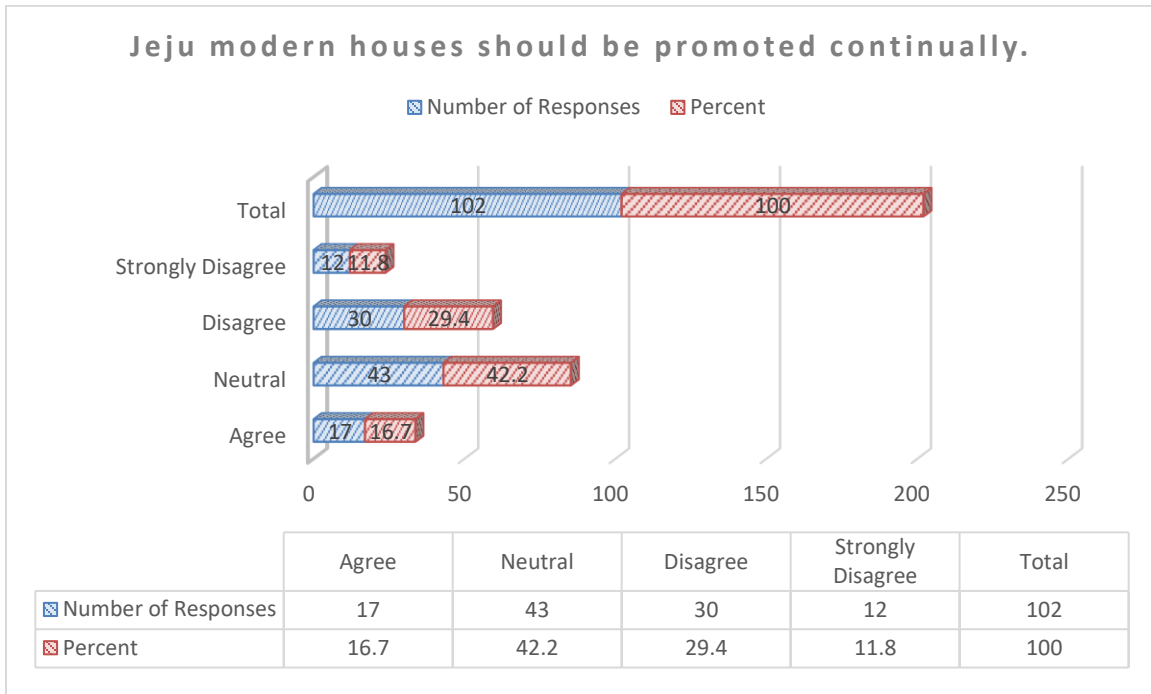
Perhaps unsurprisingly, Modern homes are not seen as representing Jeju culture and history. Modern homes are by their nature not associated with traditional Jeju society so the responses to this question are expected.

6.3.5 QUESTION 20



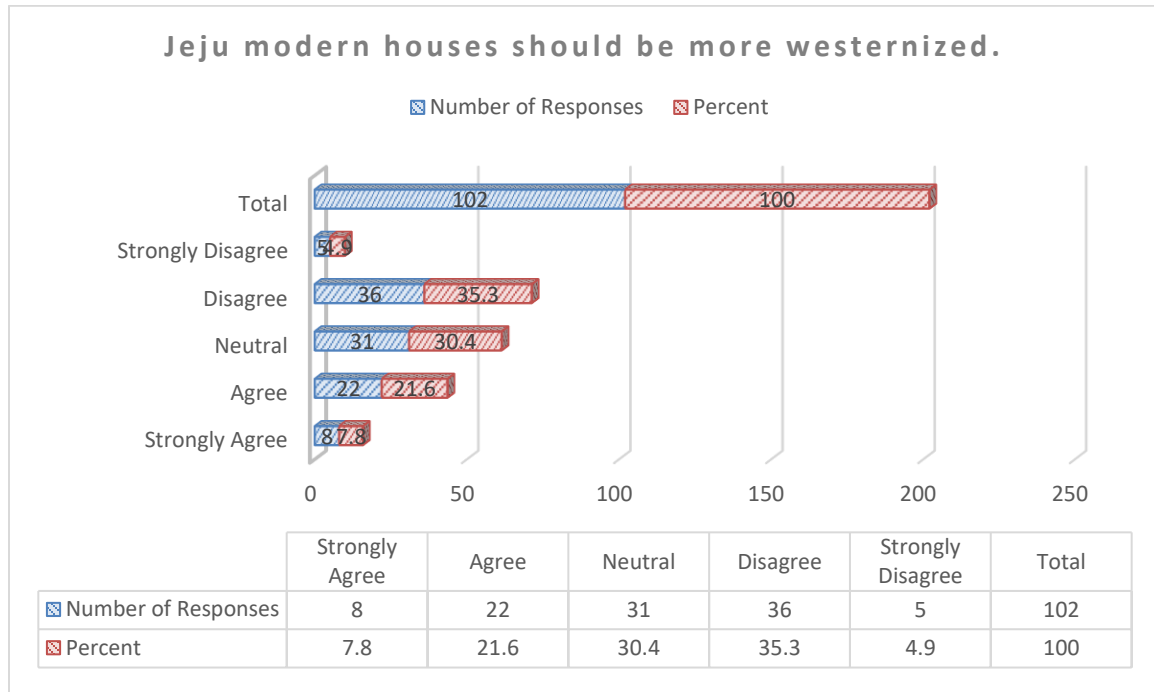
Modern homes were imported to Cheju from other regions, so it is expected that respondents would not see them as distinct from modern homes in other areas. In general, a defining feature of modern homes is homogeny, caused by the application by an architectural or development firm of a central design to numerous homes in different areas.

6.3.6 QUESTION 21



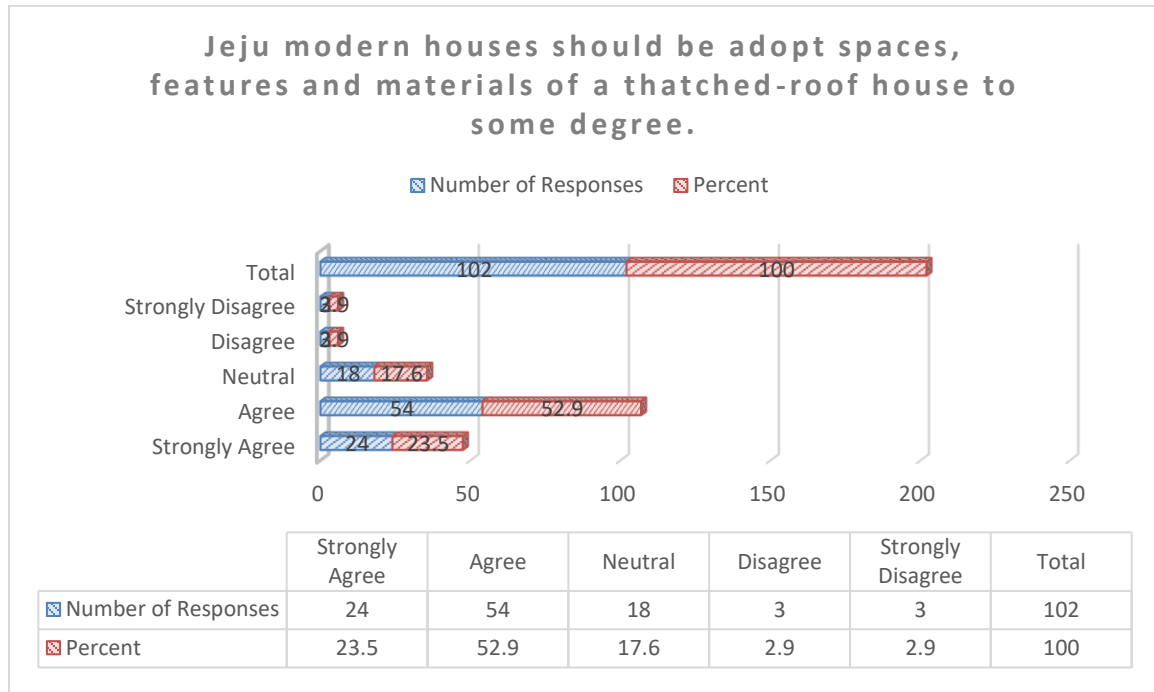
It's difficult to imagine to what end modern homes would be promoted. They are already the dominant residential construction on Jeju, and respondents seem to be either neutral or in disagreement that modern homes need any type of special promotion.

6.3.7 QUESTION 22



Westernization is not a major trend in opinion. There is more resistance to westernization in respondents, which bodes well for *Chojip*, as respondents seem to be looking inward rather than outward with regard to their homes. Even modern homes, according to the opinions of respondents, should not be overly westernized.

6.3.8 QUESTION 23



This question reinforces the supposition that residents of Jeju are open to living in modernized *Chojip*. Even if respondents are unwilling to live in a traditional *Chojip*, they are at the very least interested in directly incorporating aspects of *Chojip* into their modern homes and spaces.

6.3.9 SUMMARY OF REPOSES ON MODERN HOMES

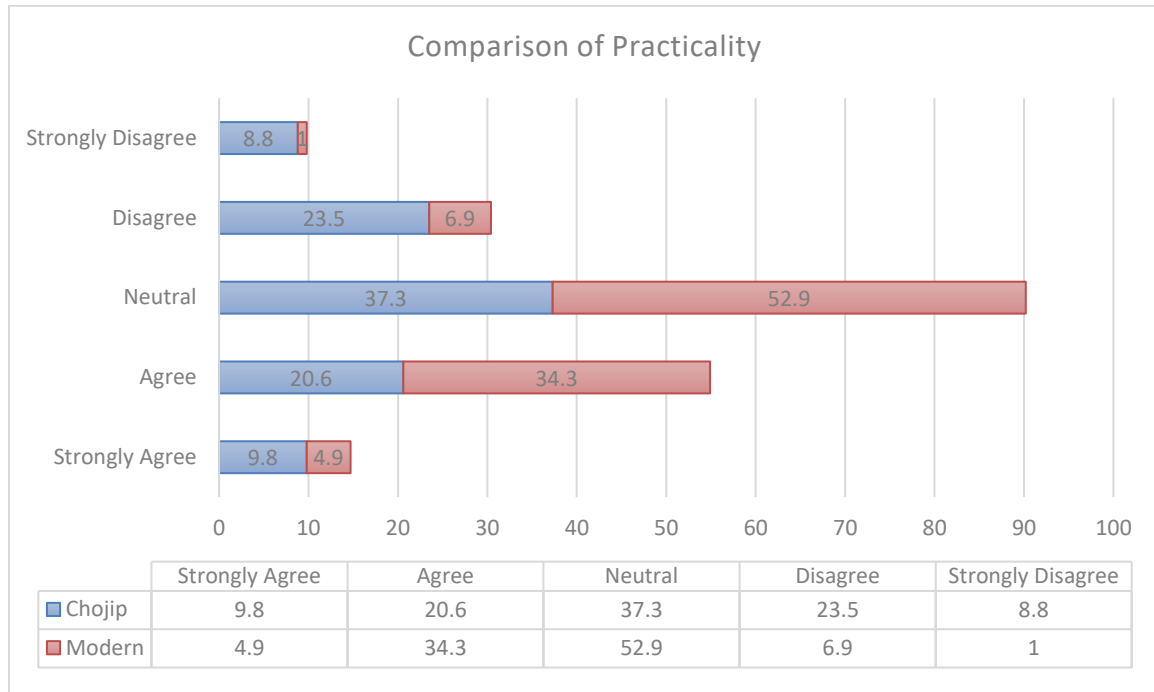
Jeju modern homes are practical, but the responses indicate that the majority of residents consider modern homes to be culturally bland, not distinct, and not representative of Jeju's culture and history. Additionally, there is a reluctance to embrace westernization as a means of updating homes. Most respondents indicated that they would like to see more aspects of *Chojip* incorporated into their modern homes. Although it is true that

respondents do not consider their modern homes to be culturally distinct, it is unclear whether or not this will factor in to future decisions on where to live, and what to build. If one were to exploit the lack of cultural identity in modern homes and specifically market a modern *Chojip* as environmentally friendly, uniquely Jeju, and distinct from western style homes, one may very likely find a receptive populace. To the credit of modern homes, they are considered fairly practical, and practicality will continue to promote their use.

6.4 DIRECT COMPARISON

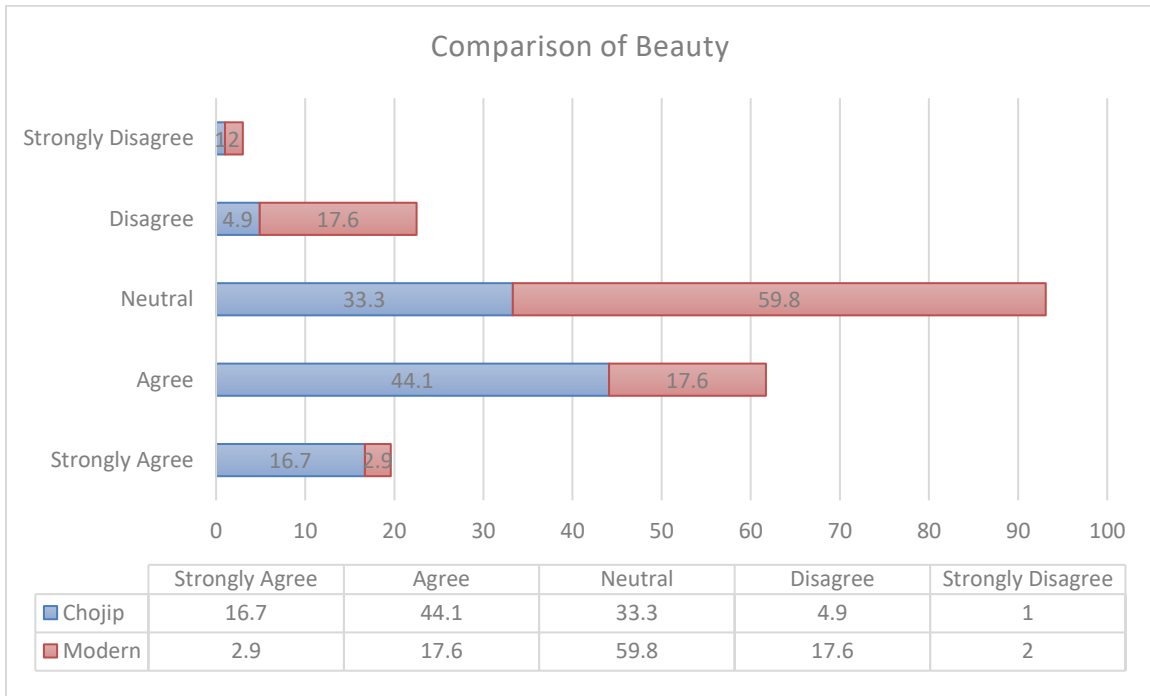
In this section the respondents' responses are directly compared, wherever possible. There are interesting differences in opinion regarding *Chojip* and modern homes, which will play an important role in determining how to move forward with a modern *Chojip* development project.

6.4.1 COMPARISON OF PRACTICALITY



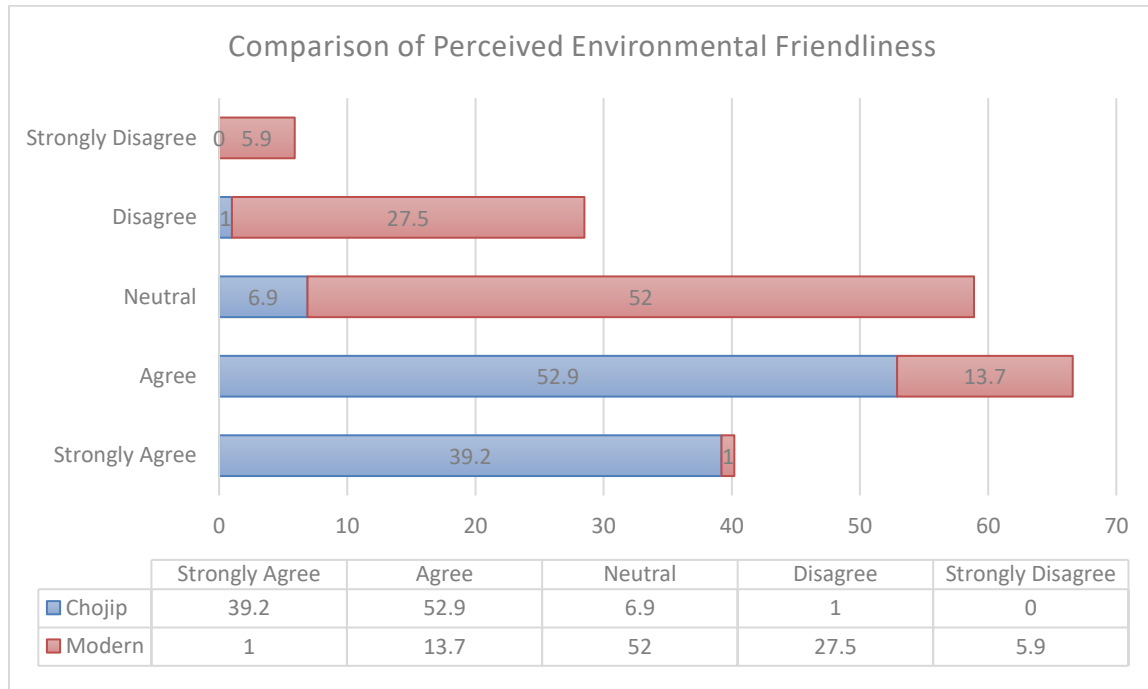
When directly comparing the perceived practicality of *Chojip* and modern homes, there is a slight difference in opinion. 32.2 percent of respondents either disagreed or strongly disagreed with the supposition that *Chojip* were practical, while only 7.9 percent disagreed or strongly disagreed with the supposition that modern homes were practical. There is thus a perceivable difference in perceived practicality that works in favor of modern homes, and to the detriment of *Chojip*.

6.4.2 COMPARISON OF BEAUTY



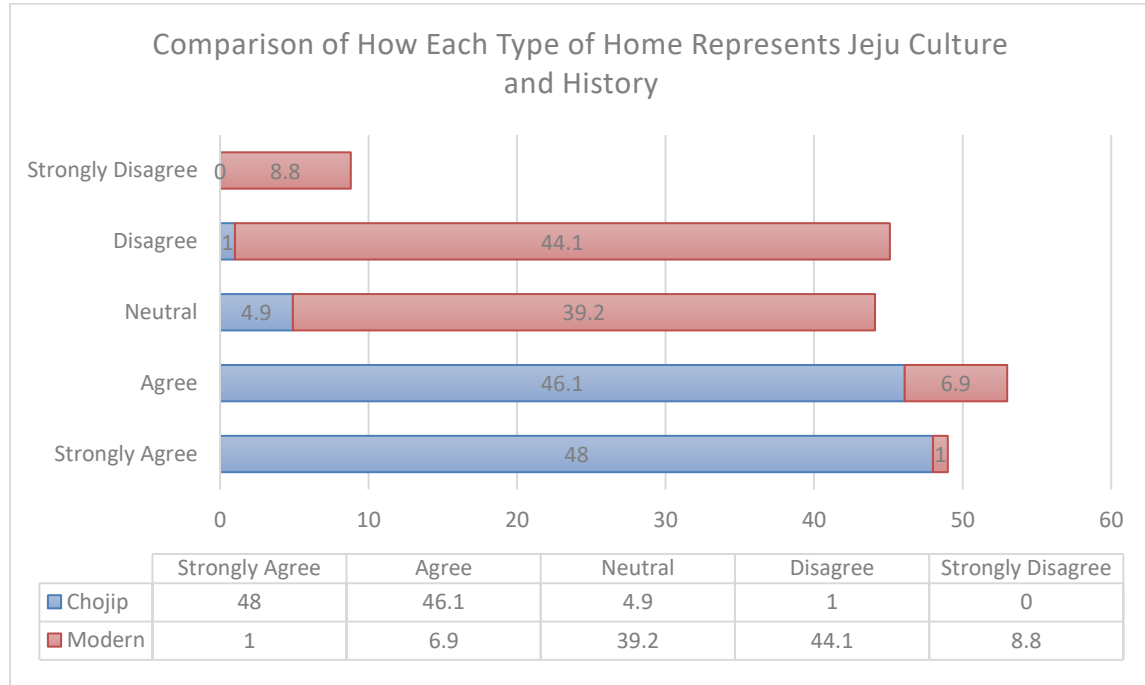
In terms of beauty, 60.8 percent of respondents either strongly agreed or agreed that *Chojip* were beautiful, while only 20.5 percent considered modern homes beautiful. *Chojip* thus have a strong advantage over modern homes in this aspect.

6.4.3 COMPARISON OF PERCEIVED ENVIRONMENTAL FRIENDLINESS



There is a strong difference in opinion on the environmentally friendly aspects of *Chojip* and modern homes. The great majority of respondents, 92.1 percent, either agree or strongly agree that *Chojip* are environmentally friendly, while only 14.7 percent of respondents agreed or strongly agreed that modern homes are environmentally friendly. Additionally, 33.4 percent of respondents disagreed that modern homes are environmentally friendly. For individuals who value environmentally friendly construction, this is a major difference.

6.4.4 COMPARISON OF HOW EACH TYPE OF HOME REPRESENTS JEJU CULTURE AND HISTORY



There is an even greater difference in opinion on which type of home represents Jeju island's culture and history. Again, the vast majority of respondents, 94.1 percent, either agreed or strongly agreed that *Chojip* represent Jeju culture and history, while a mere 7.9 percent of respondents had the same response for modern homes. More than half of the respondents disagreed or strongly disagreed that modern homes represent Jeju culture and history. This again shows the potential for future projects that address the lack of culture in new Jeju building constructions.

6.5 RESPONSES TO NON-RANKED-AGREEMENT QUESTIONS

Questions 14 and 24 asked more open ended questions to respondents, and their responses are summarized in this section. These open ended questions allow one to get a clear and detailed understanding of what respondents want out of a modern *Chojip*, and are quite important in deciding how to move forward with the project.

6.5.1 QUESTION 14: PRESERVING *CHOJIP*

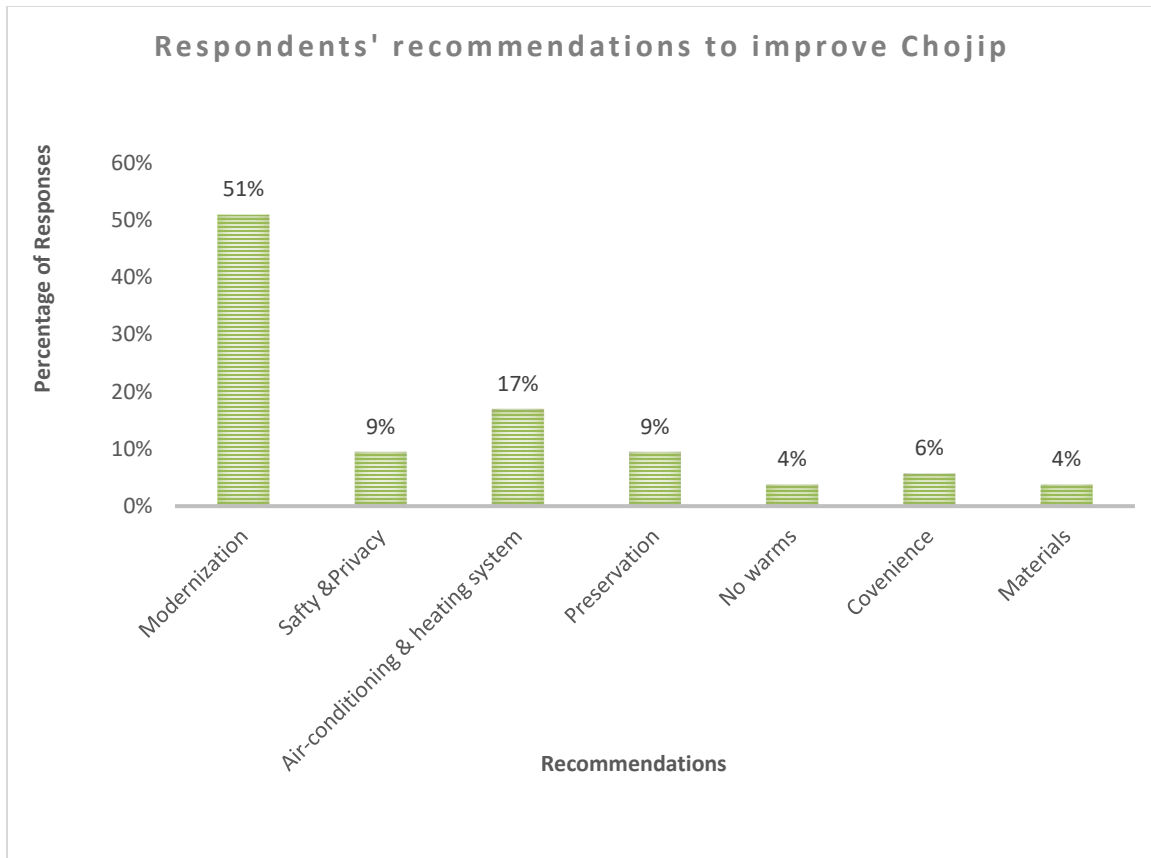
This question asked respondents to identify aspects of traditional *Chojip* which should be preserved in modern constructions. Although most respondents indicated a desire to modernize *Chojip* in order to make them more appealing as a primary residence, certain aspects of the traditional *Chojip* were singled out as in need of preservation. That is, certain features of *Chojip* should not be changed. The majority of these features involve exterior spaces and materials. Especially, respondents indicated that *Ueyong* (a vegetable garden), *Doldam* (a stone fence surrounding the property), and the use of soil and volcanic stone in constructing the *Chojip* are important enough to preserve without change. Interior spaces, however, do not seem to need any special preservation, and respondents did not seem to have strong opinions about preserving these interior spaces. The four highest ranked areas for preservation are listed below, all dealing with outdoor spaces, appearance, and materials

Highest ranked areas of *Chojip* which should be preserved

- *Ueyong* ‘Vegetable Garden’: 71.6%
- *Doldam* ‘Stone Fence’: 67.6%
- *Heulk* ‘Soil’: 63.7%
- *Hyeonmuam* ‘Volcanic Stone’: 57.8%

6.6 OPEN ENDED QUESTION NUMBER 24 RESPONSES

The responses to question 24 deserve special attention. This was an open ended question, which simply asked, “In order to improve *Chojip*, what do you think needs to be considered?” A total of 39 people out of 102 participants responded. The results strongly correlate with those of question 14, which asked respondents to choose which aspects of *Chojip* should be preserved. Briefly, while question 14 showed that respondents wanted to preserve the visual aspects of *Chojip*, especially the exterior appearance and the types of materials which were used, the majority of respondents wanted the opposite for the interior. That is, they wanted a modern and up-to-date interior, and showed little concern for preservation. The graph below gives a general look at what respondents want in terms of a modern *Chojip*. The graph is explained in more detail below.



More than half of the responses suggested modernizing the Kitchen, bathroom, ceiling, doors and windows. In more detail, they preferred to have the toilet and the kitchen inside the building rather than outside, which is where they were traditionally located in pre-modern *Chojip*. Respondents wanted to raise the ceiling, as traditional pre-modern *Chojip* had low ceilings for increased insulation. Also regarding climate, 17 percent of responses wanted to modernize the air-conditioning and heating systems, as traditional *Chojip* used airflow for cooling, and wood-burning stoves for heating. One respondent suggested combining *gulumuk* (the traditional wood-burning heater) with the modern heating system if possible. This may entail having a central heat radiator, with a traditional appearance.

Safety was a concern for 9% of respondents, and this is one area where respondents indicated a desire to update part of the outside appearance of *Chojip*. Traditionally, the entrance to one's property was closed by a gate. The gate, however, consists of three wooden poles, spaced fairly far apart. The gate was more symbolic, and did not provide any sense of privacy or protection, as any passer-by could see clearly into the property, or enter the property, even if the gate was closed. Thus, some respondents expressed a desire for a modern gate, and other modern safety accessories.

A smaller number of respondents were concerned about the durability of wooden construction materials, thatched roofs, and overall having the conveniences of modern apartment living preserved as-is when building modern *Chojip*. This is especially true with regard to the interior, while the exterior is generally thought of as an aspect of *Chojip* to be preserved, rather than modernized.

There is a common thread among the responses, that is, that *Chojip* as a home have not changed at all since modern homes began taking over. Respondents assume that *Chojip* by definition have wood burning heaters, that the bathroom is located outside, that it is open to drafts, that it has little or no space for electrical appliances, that water will leak through the thatched roof, that the thatch will need constant maintenance, that the ceiling will be very low, that it will be smoky inside, and that the kitchen will have no modern appliances whatsoever. This underscores the problem of presenting *Chojip* as a museum piece, something that existed in the past, and that is preserved in a few areas for modern residents to marvel at, but not as a viable place of residence for anyone accustomed to the conveniences of modern life. In order to counteract this, it is imperative that *Chojip* be presented as an integral part of Jeju culture, that its shape, its usage of materials, and aspects of its design are not only appropriate for Jeju, but that there is no reason to assume right off the bat that *Chojip* are relics that cannot be modernized. Much to the contrary, if *Chojip*

were built with residences concerns in mind, especially regarding the modernization of the interior, then this attitude that *Chojip* are relics of the past will surely be lost, and *Chojip* will flourish on Jeju.

6.7 CONCLUSION

This survey was an overall success. By analyzing its results several aspects of the respondents' opinions can be described and incorporated into a larger project designed to promote, preserve, and construct *Chojip*. Firstly, the *Chojip*'s strengths are in its aesthetics and its cultural significance. Respondents consider *Chojip* particularly beautiful and important for more existential reasons than modern homes. Respondents want *Chojip* to be preserved for their own sake, and the *Chojip* has a significance beyond its primary role as a domicile. A weakness in *Chojip* appear to center around its practicality and modernity. If *Chojip* are going to survive as actual places of residence, and not just museum pieces, then they must be seen as viable alternatives to the modern homes.

When addressing these issues by updating *Chojip* for modern home owners, the survey also pinpointed several aspects of *Chojip* that are better left unchanged. That is, areas of the home where respondents indicated a desire for preservation. Use of volcanic stones and soil in construction, construction of traditional gates and volcanic stone walls, and the presence of a vegetable garden are the most important aspects of *Chojip* for preservation. At the same time, while respondents are open to preserving the appearance of *Chojip*, they are quick to suggest improving and modernizing the interior. Respondents want traditional aesthetics but modern conveniences. Put another way, they want *Chojip* to preserve the appearance of the past, but to embrace modernity with things like modern

kitchens, raised ceilings, indoor bathrooms, central cooling and heating, and more modern interior design.

Finally, respondents generally view the *Chojip* as environmentally friendly, and prefer it to modern homes for this reason. While it is not necessarily true that traditional is synonymous with environmentally friendly, and it is also not true that modern constructions are by their nature are not environmentally friendly, the perception of traditional homes as environmentally friendly may play an important role in promoting *Chojip* and in selection of materials and construction techniques. Choosing sustainability wherever it is possible, will only serve to make *Chojip* more appealing to the local population.

Designing a modern *Chojip* that addresses these issues will hinge on the ability to apply modern living to a traditional template, without overwhelming the uniqueness of *Chojip* with the more negative aspects of modern appliance and design homogeny.

Chapter 7: Design of Jeju House

7.1 INTRODUCTION

The main goal of designing Jeju House is to incorporate and convey layers of the architectural, philosophical, environment and cultural profundities of the Jeju traditional house *Chojip* while adding modern and creative characteristics that can improve upon the traditional design for the convenience of modern residents.

At the beginning of the design development, Jeju residents' opinions, reservations, and suggestions were taken into consideration in order to adopt them into the design of Jeju House and to make the final design as relevant as possible for current Jeju residents. For example, several survey respondents expressed a desire to maintain certain elements of original *Chojip* design, i.e. the *Ueyong* 'Vegetable Garden', *Doldam* 'Stone Fence' and the usage of *Heulk* 'Soil' and *Hyeonmuam* 'Volcanic Stone' as building materials. Moreover, the survey respondents wanted to preserve the visual aspects of *Chojip*, especially the exterior appearance and the types of materials used. However, the majority of respondents from the survey wanted the opposite for the interior. That is, they expressed a desire for improvements in the interior design, modern upgrades, convenience, and privacy and safety.

In terms of my final design, the ultimate challenge was to embrace and respect the residents' wishes while still implementing my individual goals and design creativity. In order to do this, I drew from my experience staying in a modernized *Chojip* during the summer of 2016 as well as a month long fieldwork completed during the summer of 2015. With my personal experiences in *Chojip* supplemented with residents' survey responses, I have placed a strong emphasis on local identity in the reinterpretation of *Chojip* with a

sound understanding of local culture, society, lifestyle and Jeju island's natural environment.

7.2 PRELIMINARY BASIC CONCEPTUAL DESIGN

While integrating the various recommendations from Jeju residents' survey results along with Jeju cultural values, the local environment, a basic conceptual design of “Jeju” house was constructed using Rhinoceros 5.0. The first design is described in more detail below.

7.2.1 JEJU HOUSE 1.0

The basic model of Jeju House 1.0 was developed based on a traditional *Negeori* ‘quadruple house’ concept, where the home is comprised of four buildings placed in a square shape on the lot with a garden in the middle. Figure 42 shows a typical example of a one story *Chojip* with four main buildings and a courtyard in the middle for a garden. After, in Figure 43, one can see a typical example of *pungchae* ‘windbreak’, an extended thatch which protects the building from the elements.



Figure 42: *Negeori* ‘quadruple house’.



Figure 43: *Pungchae* ‘windbreak’.

These basic design elements were incorporated into Jeju house 1.0. Note that the garden space is retained, after considering Jeju residents’ input. The four building are now connected, though still occupy distinct areas. There is a single roof structure, which has a curve shape roof representing Jeju *oreum* ‘volcanic cone’ as well as the traditional round thatched-roof of *Chojip*. The roof curves downward, incorporating the *pungchae*, and the central garden has space for sunlight. This basic design can be seen in Figure 44 below.

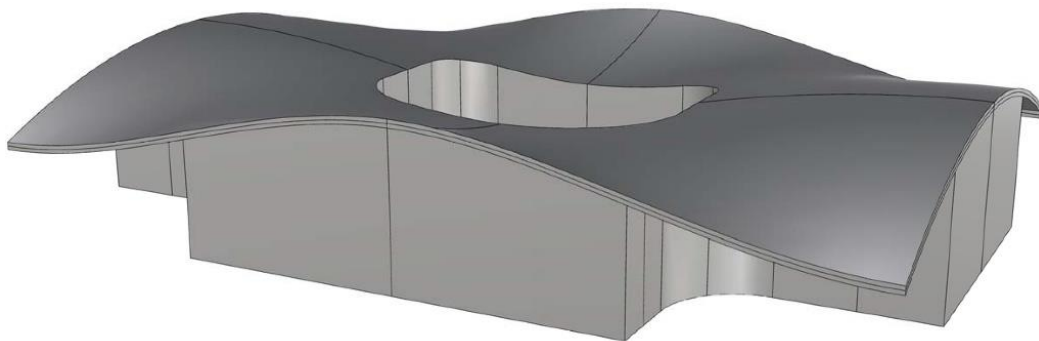


Figure 44: Jeju House 1.0.

7.2.2 JEJU HOUSE 2.0

While maintaining the basic design of Jeju House 1.0, an updated design was developed with the addition of a second floor. Although *Chojip* are traditionally one floor, a second floor adds a level of convenience not found in single floor homes. It also satisfies many of the respondent's desires to have an "apartment like feel" to the interior. Figure 45 shows the updated two-story Jeju House. Balconies at each of the four corners of the building were also added to allow residents to experience panoramic views of the natural surroundings.

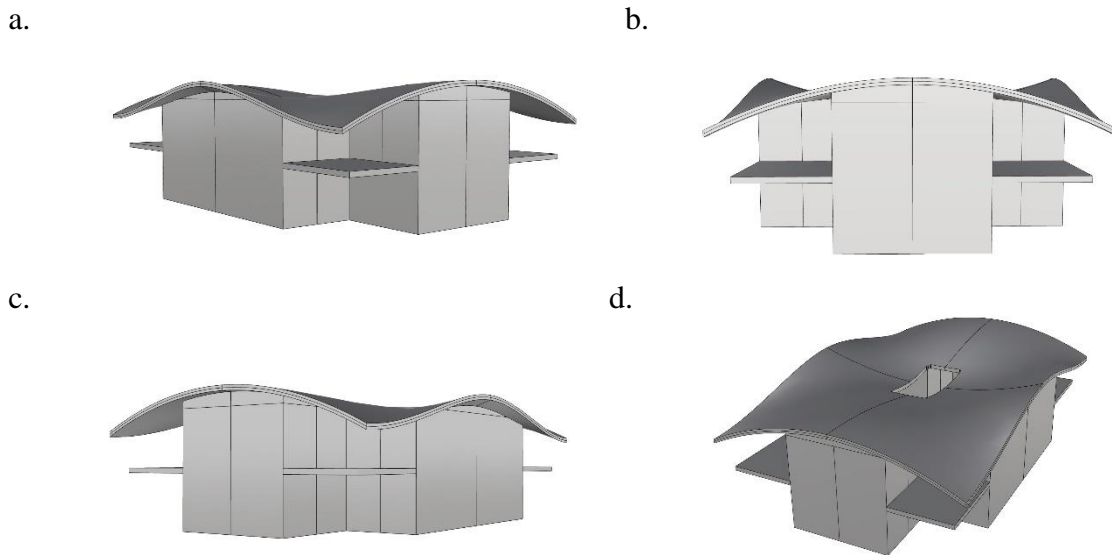


Figure 45: Jeju House 2.0.

7.3 BASIC MODULES

7.3.1 ROOF MODULES

Two sets of modules were used to create Jeju House design. The first set of modules, shown in detail below (See Figure 46), were used to create the roof shape.

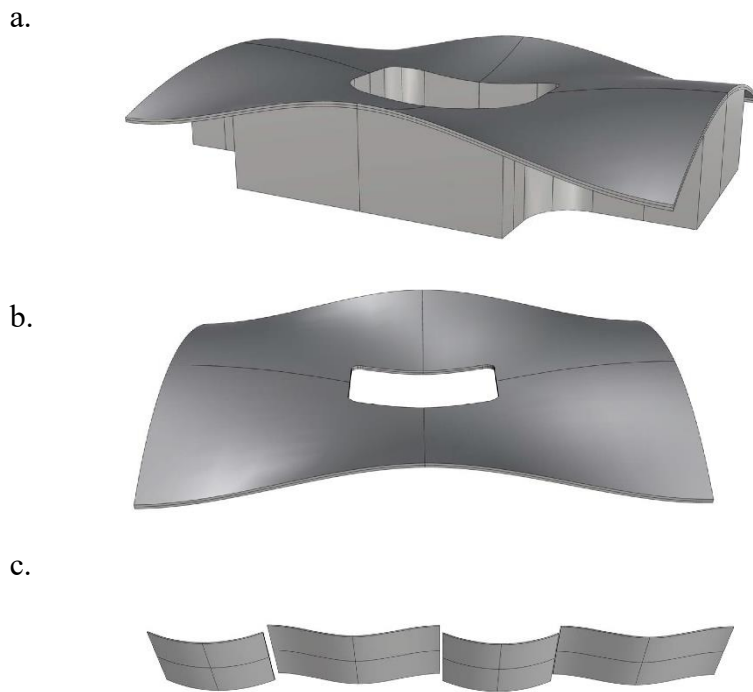


Figure 46: Roof modules.

7.3.2 EXTERIOR WALL MODULES

The second set of modules, in detail below, were used to create the interior wall around the central garden as well as the exterior wall. The exterior modules are shown first, followed by the garden wall modules.

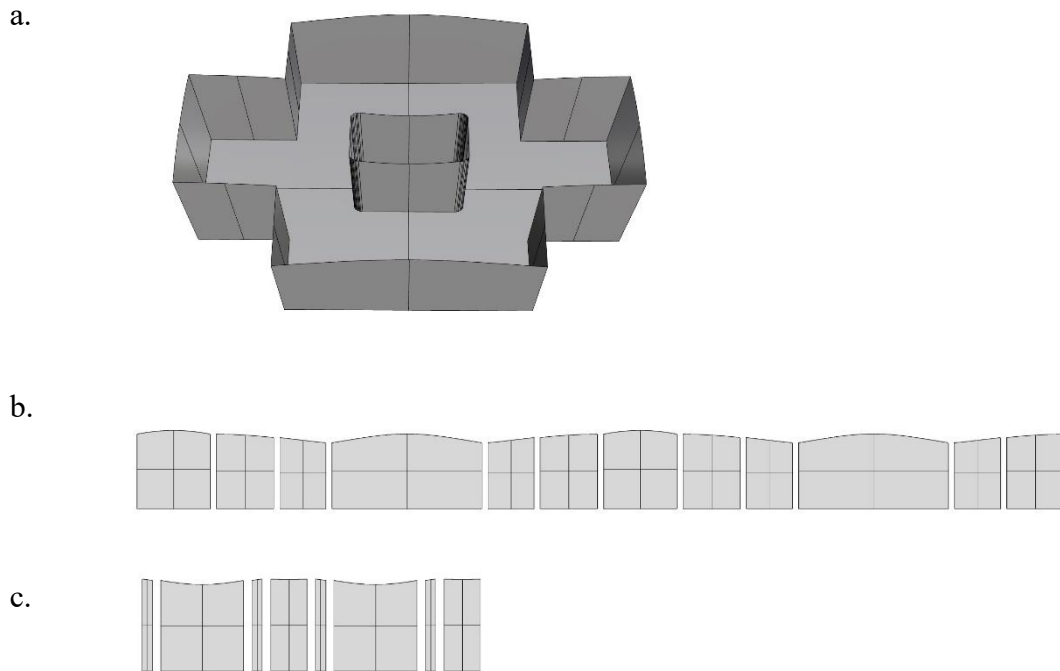


Figure 47: Exterior wall modules.

7.3.3 DIGITAL FABRICATION

Jeju House 1.0 lacked an exterior which incorporated a volcanic stone design. In Jeju House 2.0, a cosmetic wall structure was added which draws visual inspiration directly from the typical geometric shapes of volcanic stone traditional walls. The wall structure was developed with the Voronoi diagram using Grasshopper (version 0.9). Figure 48 below provides a side-by-side comparison of traditional volcanic stone walls with the new wall curtain.

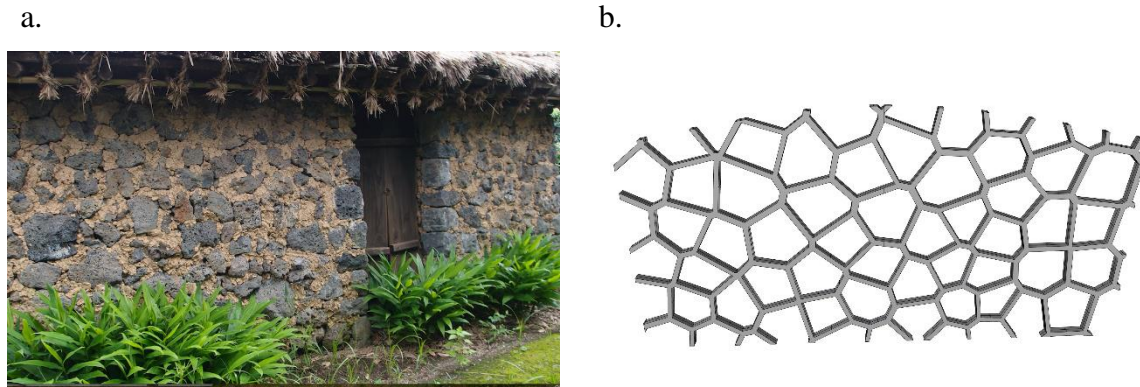


Figure 48: The traditional volcanic stone wall and the Voronoi wall.

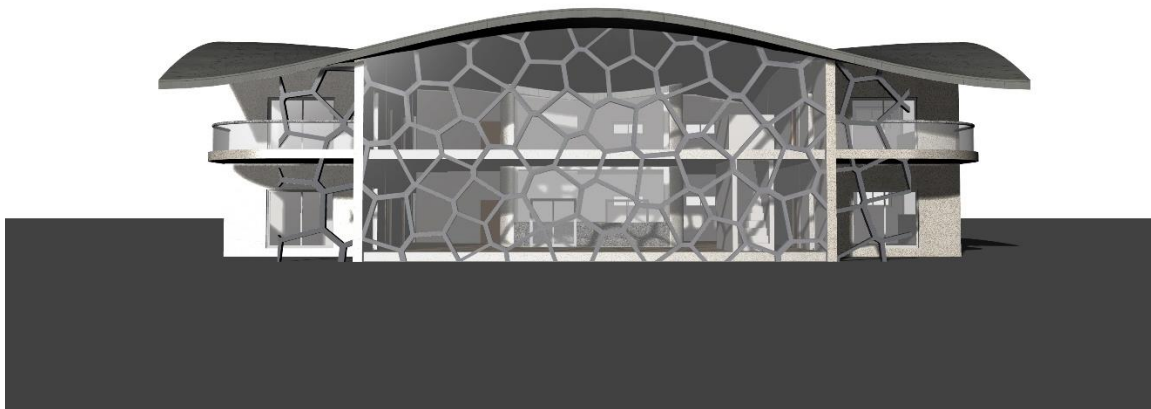


Figure 49: Exterior Voronoi wall.

7.4 EXTENDED MODELS

7.4.1 JEJU HOUSE 3.0

The basic model for Jeju House 3.0 was developed based on *Dugeori* ‘double house’ which has two separate buildings facing each other. Although *Dugeori* is slightly

smaller, as it has only two buildings, the space can be clearly separated into buildings for each generation. Figure 50 shows a typical example of a one story *Chojip* in the *dugeori* configuration.



Figure 50: *Dugeori* 'double house'.

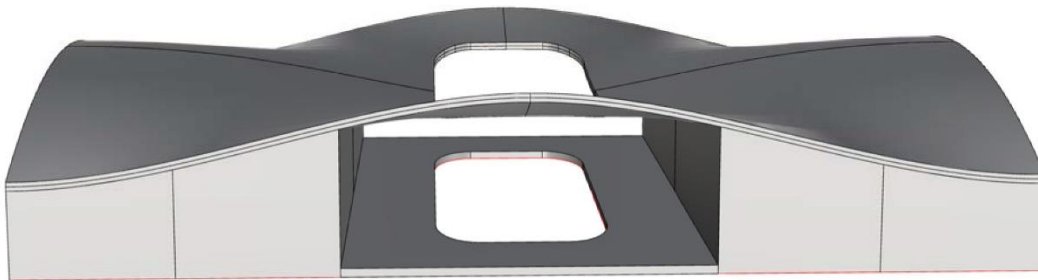


Figure 51: Jeju House 3.0.

Of the three models, Jeju House 2.0 was chosen for further development. Jeju house 1.0 and 3.0 will not be considered for the final design.

7.5 MATERIALS

The basic materials used for Jeju House are wood, stone, glass, concrete and metal.

A short description of how each material is used follows:

- Wood: floors (1st and 2nd floors)
- Concrete: exterior walls and interior wall
- Volcanic: small garden
- Aluminum zinc: roof and Voronoi diagrams

Not only is Volcanic rock traditionally important in Jeju constructions, it was specifically mentioned in the surveys as something residents would like to preserve from traditional *Chojip*. Volcanic rocks were at one time readily available on the island and were common natural building materials until the demolition of *Chojip* started in the 70's. For several decades thereafter, processed volcanic stones became more popular for building construction. However, in recent years, as the natural beauty of volcanic rocks has both a tourist attraction and a point of interest for architects, volcanic stones have found their way back into modern constructions, in conjunction with modern materials such as metal and concrete. In Jeju House, volcanic rocks are used for interior room walls rather than exterior walls so that residents themselves can enjoy the beauty of black stones while they are inside their house.

Additionally, rather than thatch, zinc-aluminum panels are used for the roof because they are malleable and light. Also, they are energy efficient as they are designed to reflect sunlight and radiate heat back to the outside. Moreover, aluminum is resistant to corrosion caused by seawater while thatched roofs need to be replaced with some regularity.

7.6 THERMAL COMFORT

In order to increase residents' thermal comfort a combination of natural ventilation, shading and Trombe walls were taken into consideration in conjunction with *Ondol* and air conditioning system during the design phase. In winter, the mean average temperature on Jeju can go down to 2.6 degrees Celsius (36-37 degrees Fahrenheit) in the city of *Pyoseon*. Winter lasts for three months, typically from December to February with an average mean temperature of 5 degrees Celsius (41 degrees Fahrenheit) over the course of those three months. The traditional heating system used in Jeju is *Ondol* 'warm stone', which is a central under floor heating system.

The main energy source for heating and cooling in the mainland of Korea is imported liquefied natural gas. The cost effective gas is distributed through LPG pipelines in big cities such as Seoul, Busan and Kyeonggi areas in the mainland. However, until now *ondol* heating systems use mainly oil because Jeju Island does not have an LPG pipeline system. The use of oil is more expensive than natural gas. Therefore, using Trombe walls can help lower the cost of heating while adding no extra cost to building maintenance or utilities while also adding no pollution all while increasing residents' indoor thermal comfort. A description of Trombe walls follows.

7.6.1 WATER TROMBE WALL

A water Trombe wall is a passive solar component, which absorbs solar radiation during the day and radiates the heat into the room at night. In the Jeju House, a water wall can be constructed with fiberglass pieces held together and sealed with aquarium caulk. Geometric shapes that are identical to Voronoi diagrams are selected for the outer structure for water tanks. Each fiberglass water tank can fit into a Voronoi pattern and can also be removed if more light is needed in the room. By adding black dye, the absorption efficiency

can be increased⁹⁴ while harmonizing the appearance of the tank with the black stone interior walls. According to Adams et al., a thickness of six to nine inches is ideal.⁹⁵ As can be seen in Figure 52, more light can be provided through the outer glass, which has no fiberglass water tanks installed.

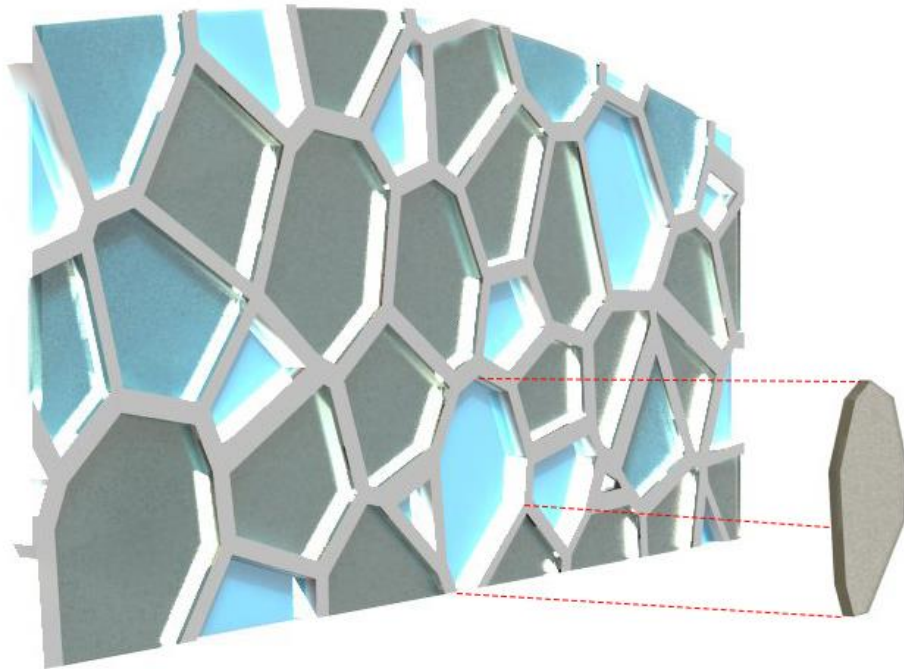


Figure 52: Water Trombe wall facing South.

An additional benefit of the Trombe design is that the dyed water provides a natural blind for privacy.

⁹⁴ "SUN-LITE THERMAL STORAGE TUBES," Solar Components Corporation, 02 Oct. 2016 <<http://www.solar-components.com/TUBES.HTM>>.

⁹⁵ Adams S, Becler M, Krauss D, Gilman C, "Not a dry subject: optimizing water Trombe wall," In: ASE S (ed) SOLAR 2010 conference May. 2010: 1.

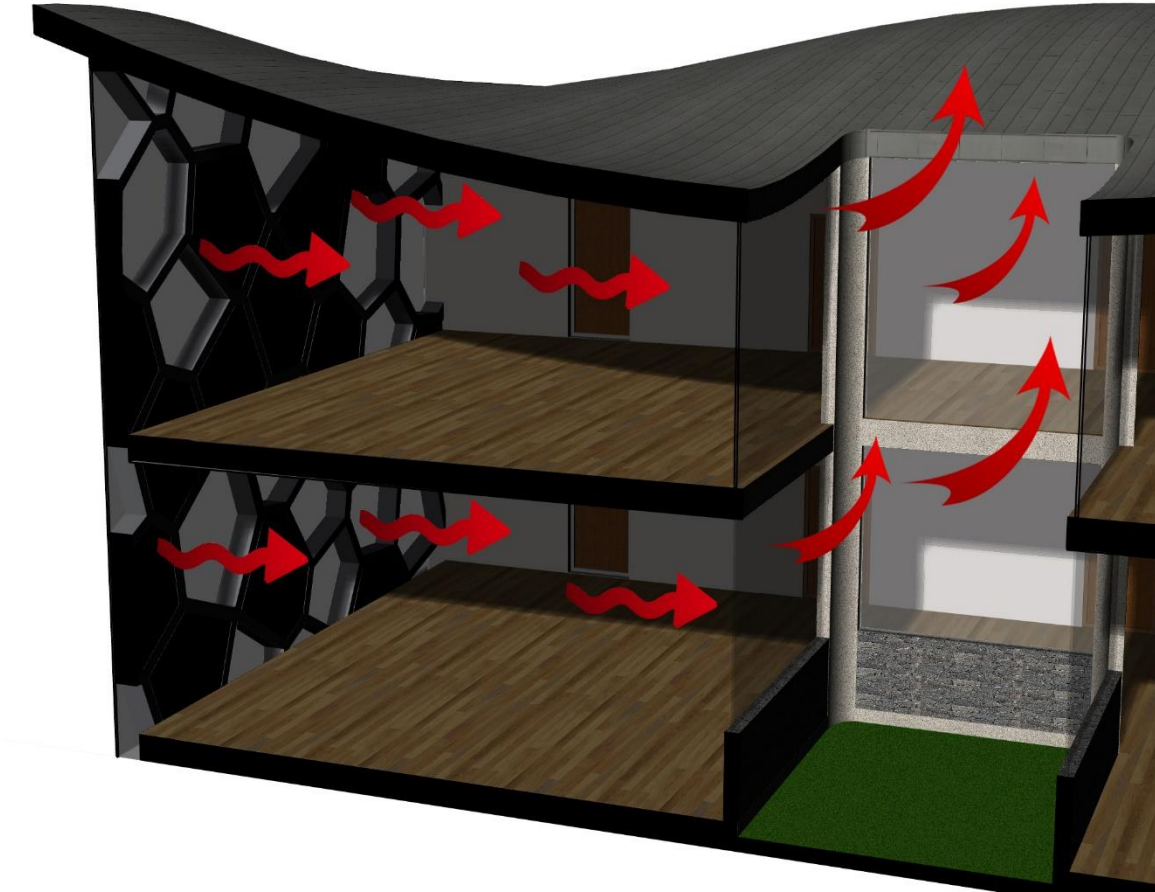


Figure 53: Warm air circulation through the water Trombe wall.

In the Jeju House, the entire outer structure is glass to provide sweeping views. As figures 54 and 55 below make clear, however, only the southern wall will ever receive direct sunlight, and direct sunlight is restricted to winter months.

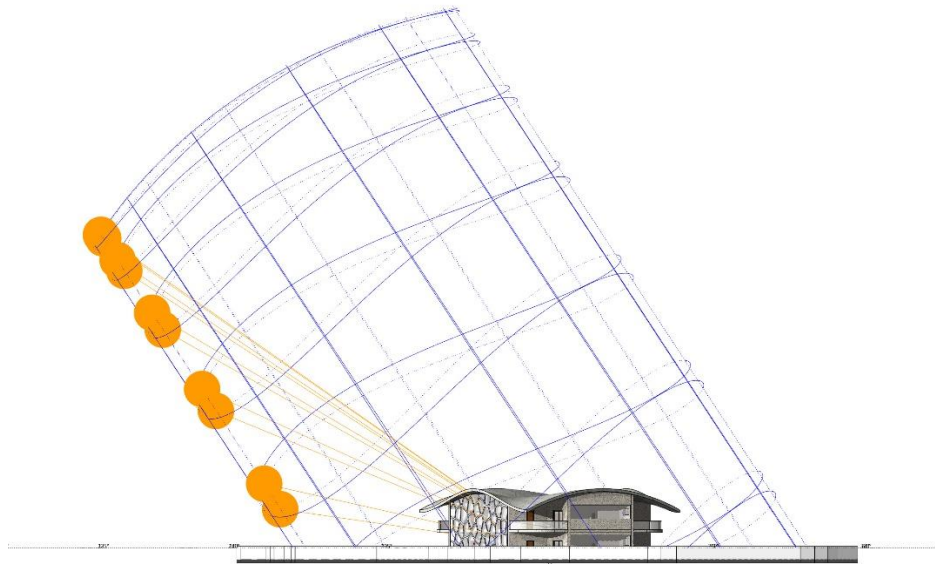


Figure 54: Direct sunlight on southern wall during winter solstice.

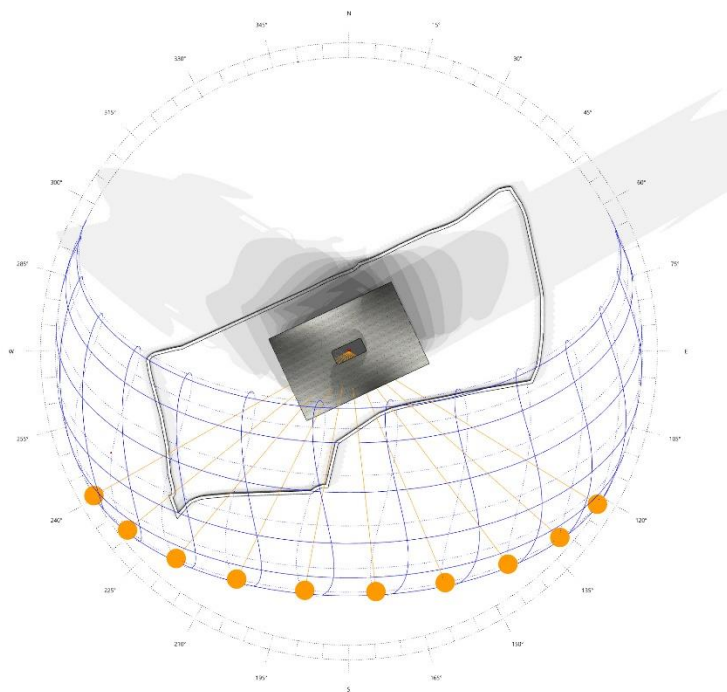


Figure 55: Top view of direct sunlight on southern wall during winter solstice.

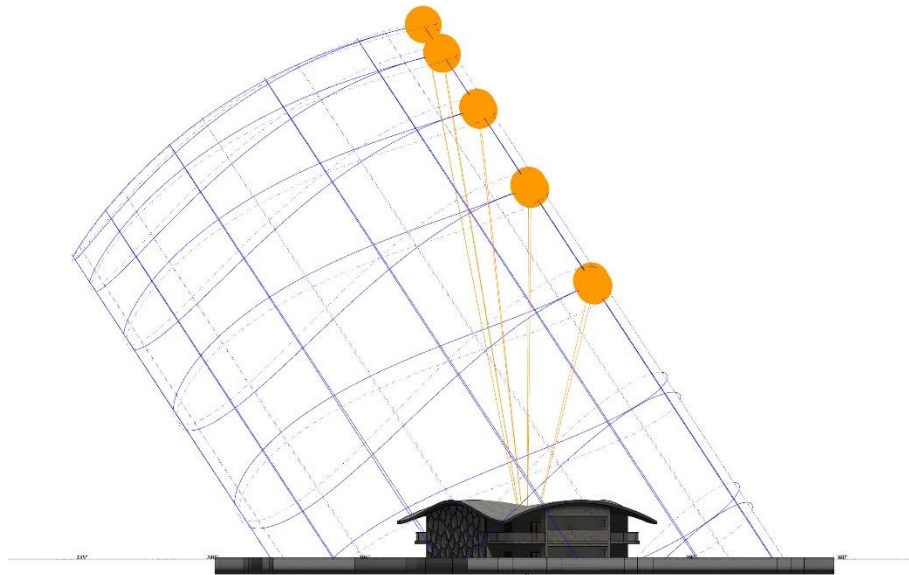


Figure 56: Lack of direct sunlight on exterior walls during summer solstice.

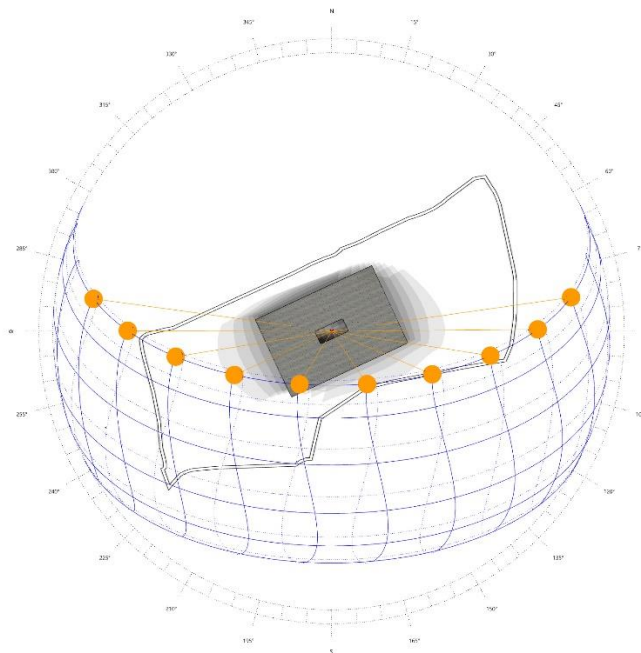


Figure 57: Top view showing sun's path over the roof during summer solstice.

Considering the sun paths, and limited direct sunlight, only the southern wall will be equipped with the water Trombe wall.

7.7 NATURAL VENTILATION

To increase natural air circulation in the building, typical wind patterns on Jeju island were investigated. Typically, wind blows from the east (which is the side facing the beach), however, wind directions do change seasonally (See Figure 59). Windows and the four balconies are the main entry points for wind. Additionally, the doors and windows in the middle of the building, which lead to the central garden, will also enhance the wind travel.

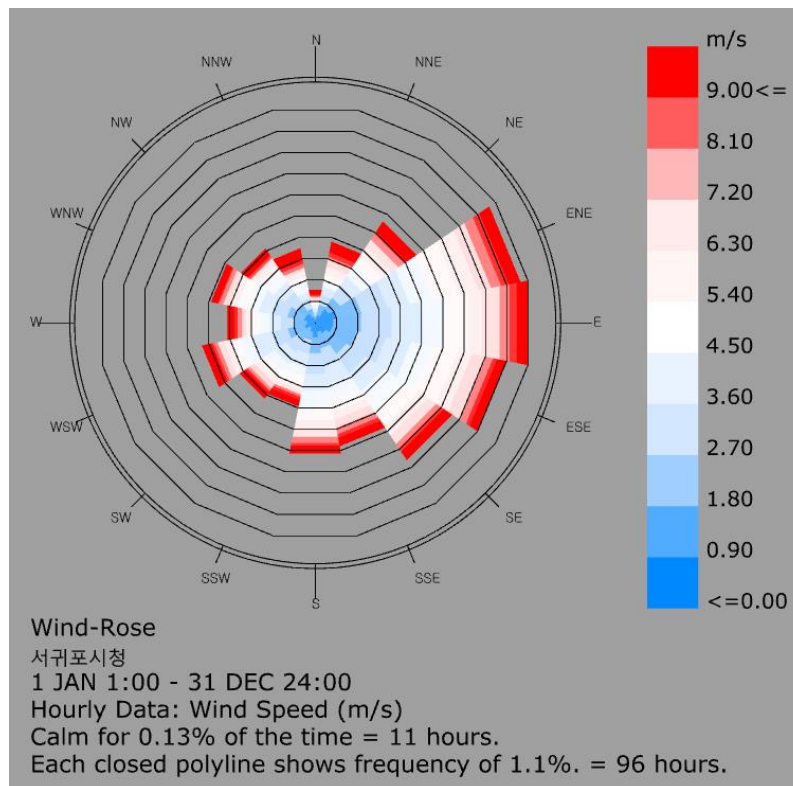


Figure 58: Average wind pattern.

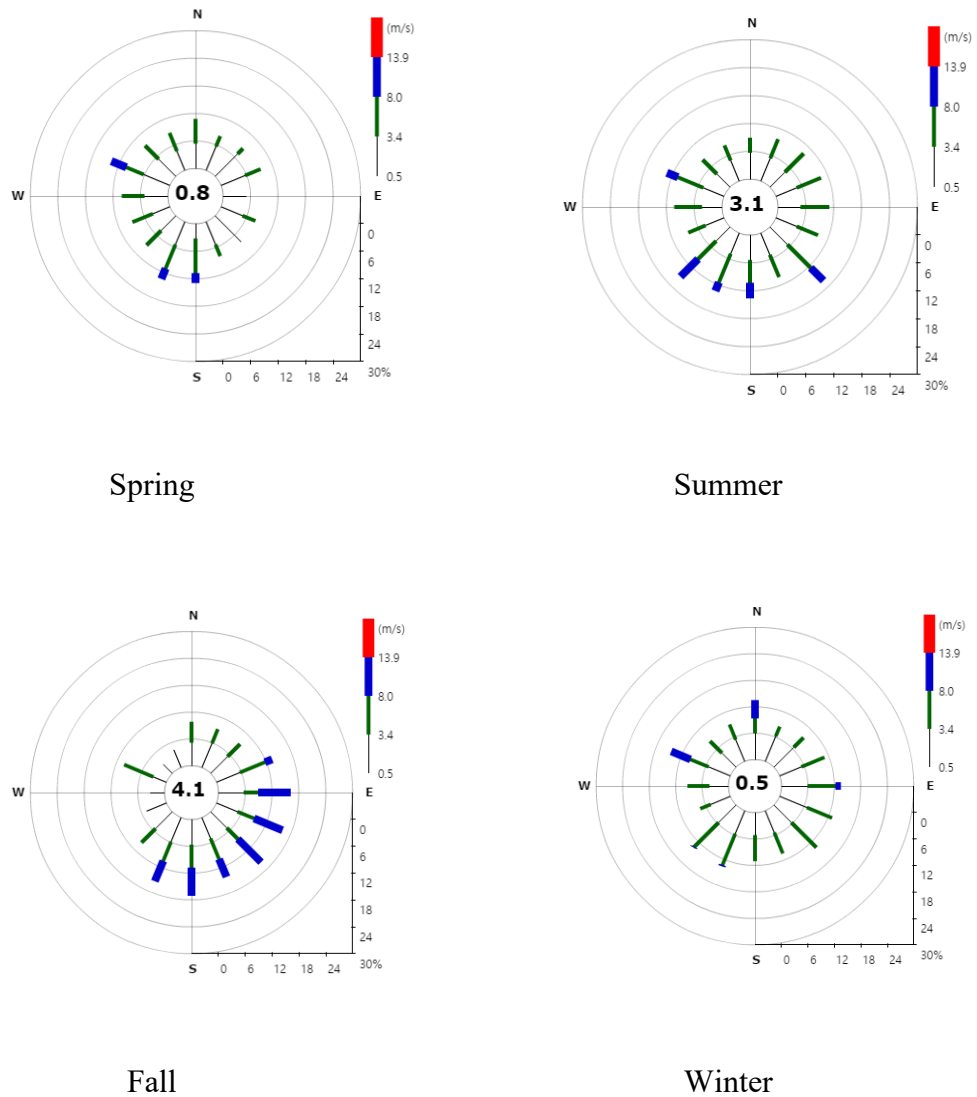


Figure 59: Seasonal wind patterns.⁹⁶

As can be seen in Figure 60, air enters the building from the four corners. The air has passage through the central garden, as well as around the garden, and can exit through the opposite corner balcony.

⁹⁶ “Korea Meteorological Administration,” Statistical analysis climate change data, 02 Oct. 2016 <<http://www.kma.go.kr/weather/climate/stats.jsp>>.

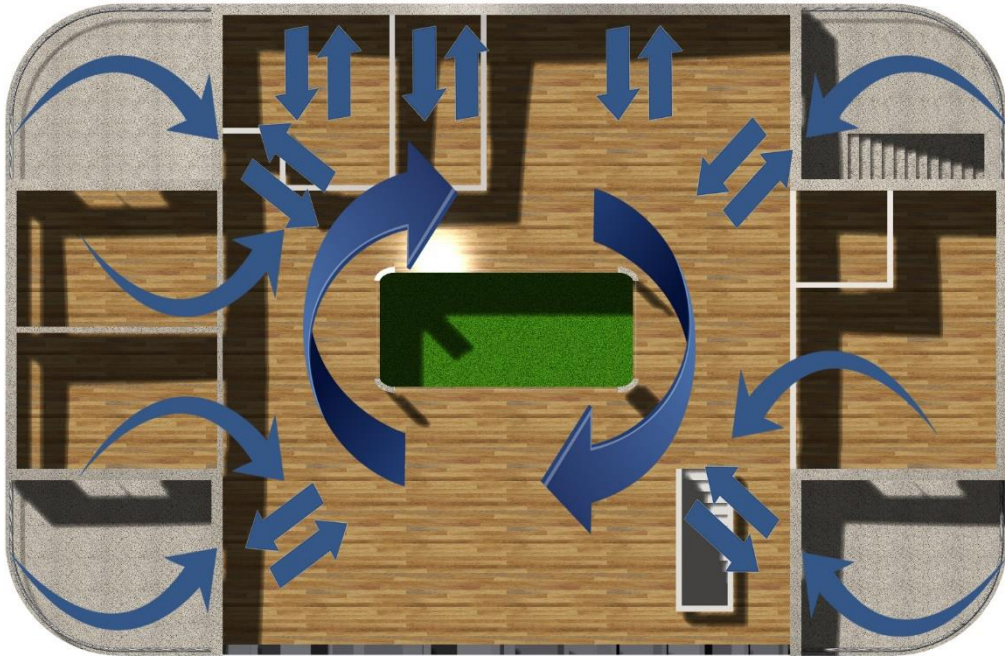


Figure 60: Indoor air circulation.

7.8 PLANTING

Cedar trees were selected to plant around the site to block the cold wind from the northwest during the winter season and also to create shade during a hot summer season. Cedar trees have been planted as a windbreak for tangerine orchards and fields on Jeju Island. They thus are the natural choice for Jeju House, as they will naturally fit into the environment. Picture 61 below shows a typical landscape of cedar on Jeju Island.



Figure 61: Cedar trees on Jeju Island.

7.9 SPACES

Jeju House features eight main spaces on each floor: 3 bedrooms, a kitchen (dining room), a living room, two bathrooms and a laundry room. Each floor is designed to be able to support an individual's domestic needs independent of the other floor, so that the house can conveniently accommodate multiple generations. However, the two floors can be easily connected through two separate staircases. The smaller spaces in Jeju House can provide individual privacy whereas larger open spaces such as the living room and the kitchen are designated for family entertainment and traditional events such as *Sikge* 'traditional ancestral rituals'.

7.9.1 BASIC FLOOR PLAN FOR THE 1ST FLOOR

The two floors have similar plans, but the first floor alone has direct access to the central garden area. The garden can be used for private family activities or growing vegetables and flowers.

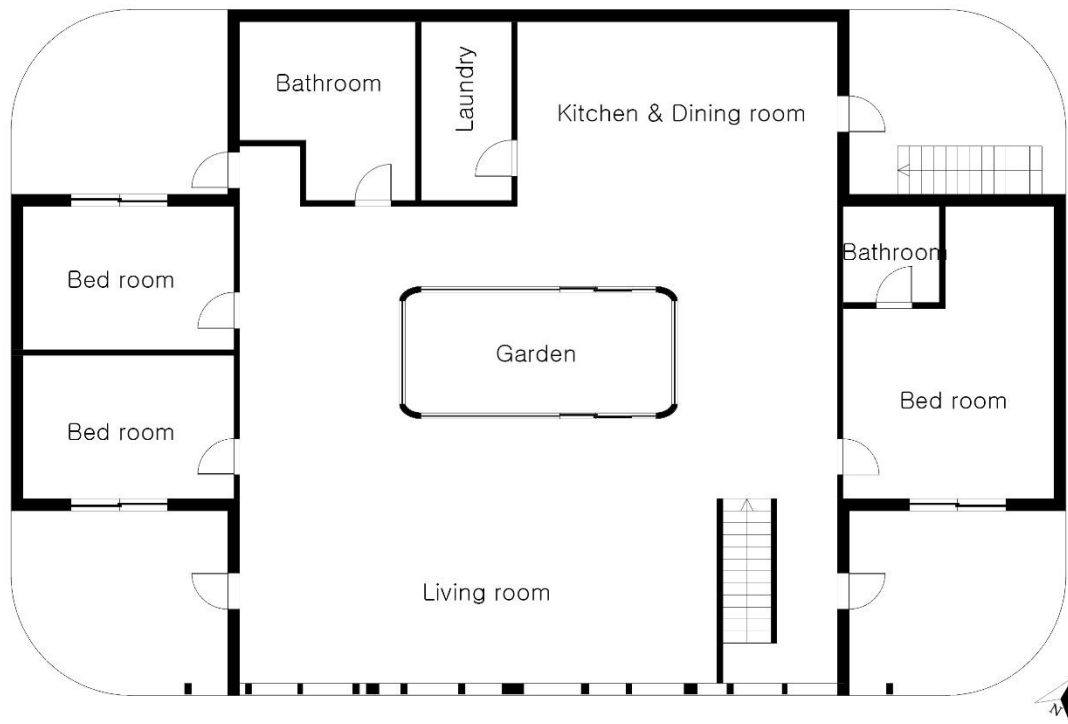


Figure 62: Basic floor plan for the first floor.

7.9.2 BASIC FLOOR PLAN FOR THE 2ND FLOOR

The second floor does not have direct garden access, but is otherwise identical to the first floor in its plan. Additionally, the second floor features four balconies on each corner which allow residents to choose their favorite view to enjoy outside. The second floor can be accessed from inside and also directly from outside to increase residents' convenience and privacy.

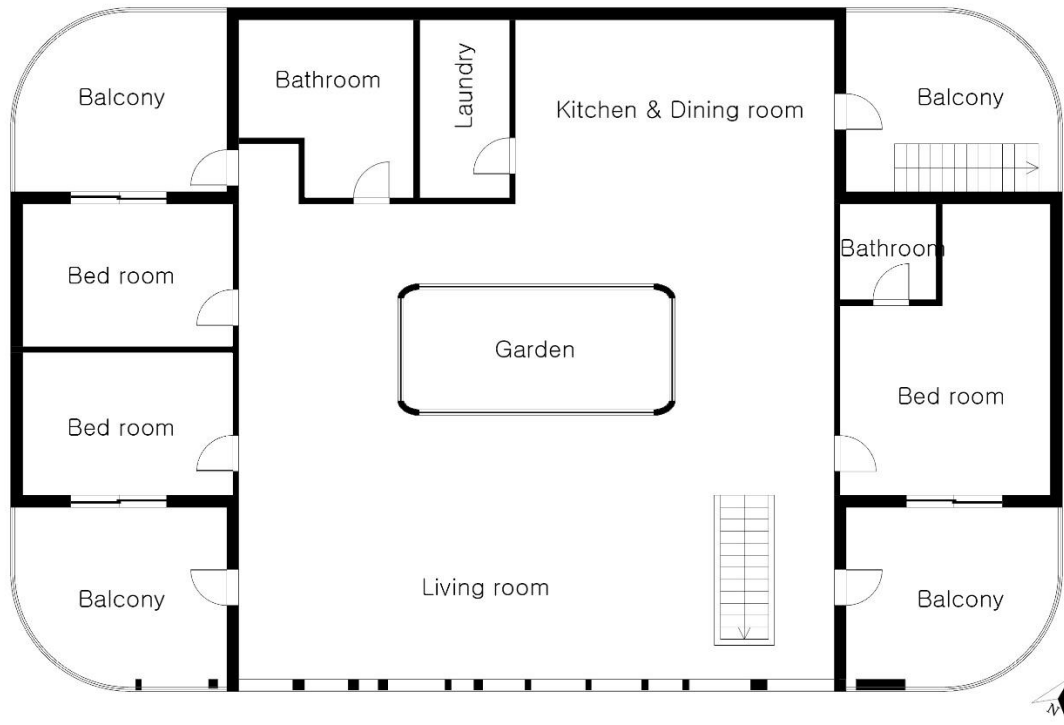


Figure 63: Basic floor plan for the second floor.

7.10 RAINWATER COLLECTION

In recent years, residents of Jeju Island have become concerned about an uninterrupted and sustainable water supply. There has been a large increase in population, which, when combined with an increase in tourists, has put strain on the island's water supply systems. Traditionally, fresh water on Jeju was accessed via natural springs. Typically, women on Jeju Island carried large water jugs to and from these springs (See Figure 64). Although important sources of water, there were few springs, which meant that women had a rather arduous journey to and from the springs with large, heavy water jugs. To make life easier, each household typically had a *chomhang* 'water jar', which could collect rainwater into a jar from a tree through a thatch aqueduct (See Figure 65).



Figure 64: Jeju woman carrying water.



Figure 65: *Chomhang* ‘water jar’.



Figure 66: Jeju woman collecting water from a fresh water spring.

Jeju House, therefore, has a rainwater collection tank installed underground, which collects rainwater runoff from the roof, which can be used for toilet flushing, cleaning and gardening (See Figure 67).

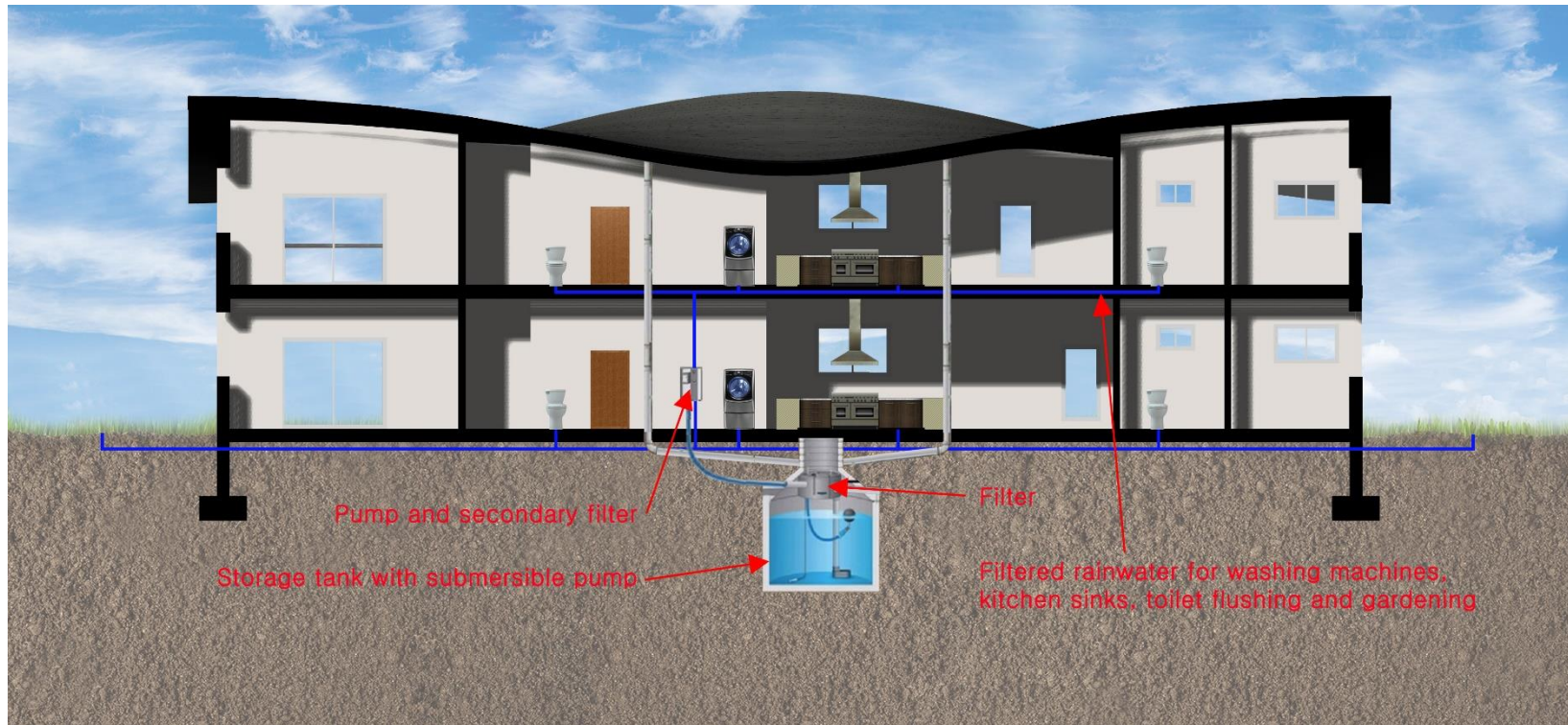


Figure 67: Rainwater collection system.

7.11 PERSPECTIVES OF JEJU HOUSE 2.0

Perspectives of the final design of Jeju House 2.0 are presented in this section. As can be seen in Figure 68 below, Jeju House 2.0 is placed in the site of *Pyoseon* facing *Pyoseon* beach (See Figure 69) with the panoramic view of volcanic cones, *Oreum* and Mt. *Halla*, the highest mountain in South Korea at the back.



Figure 68: Perspective of Jeju House 2.0 on site.



Figure 69: Pyoseon beach view from Jeju House 2.0.

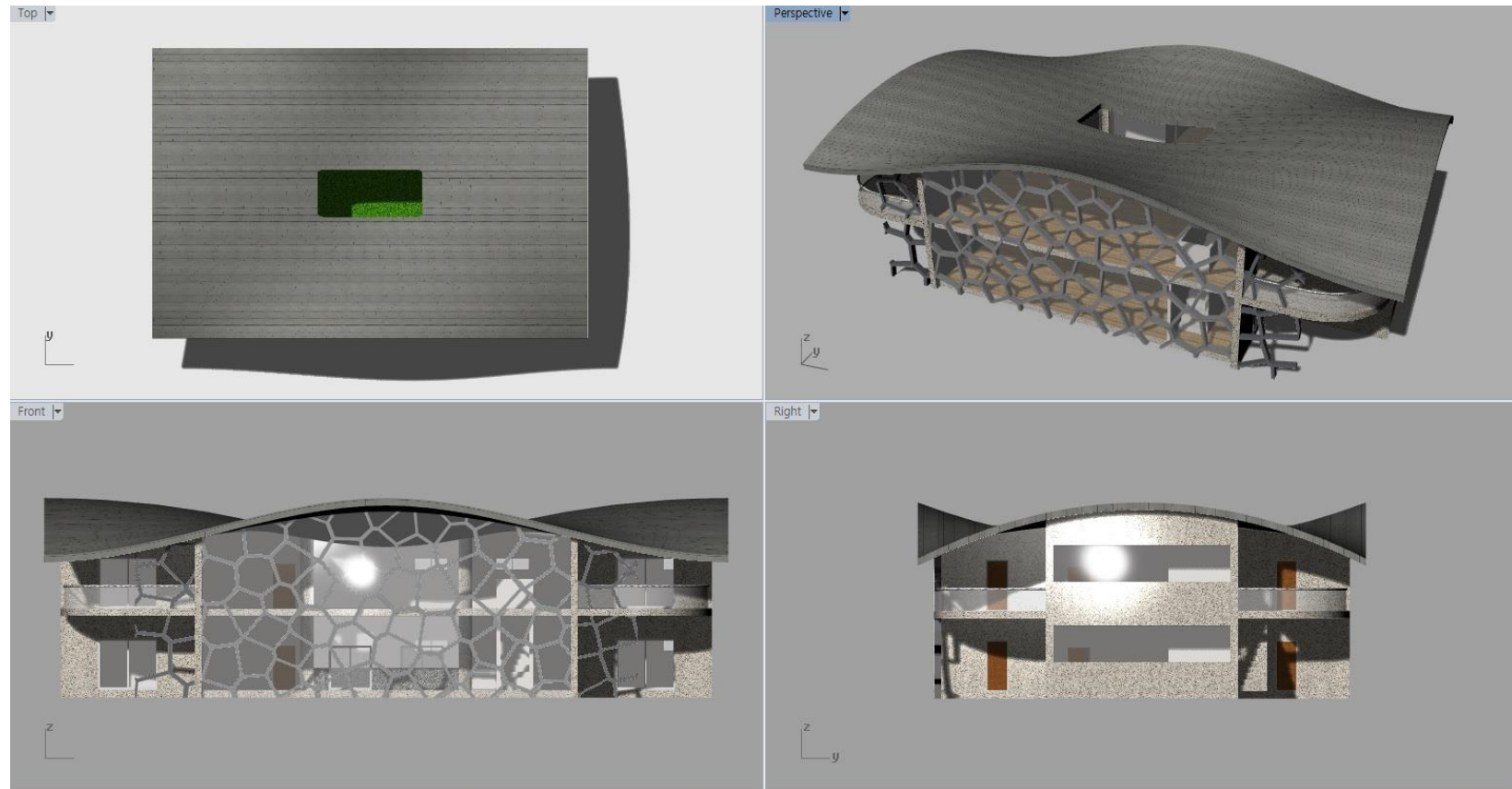


Figure 70: Exterior view of Jeju House 2.0.



Figure 71: Front view of Jeju House 2.0.



Figure 72: Corner view of Jeju House 2.0.



Figure 73: Back view of Jeju House 2.0.

Conclusion: Jeju Local Identity and Jeju House

Jeju Island has shown fast economic growth on the basis of tourism which has resulted in significant urban development. There are two major problems noticed in the rapid urbanization. First, traditional houses, streets, blocks and buildings were torn down and new streets, modern buildings apartments were built without considering the traditional characteristics of the area. Second, the use of traditional architectural forms has become ornamentation, which is rather superficial and meaningless, with no function in the modern building. Accordingly, architects who work on Jeju Island need to understand Jeju culture and traditions as well as the local natural environment before manipulating architectural techniques and materials onto their designs.

The design process of Jeju House demonstrated crucial steps to uncover Jeju local identity. The initial design process involved research on Jeju culture, history, society and nature followed by an investigation on Jeju residents' aspiration on Jeju house. Jeju House was, then, designed to reflect the desires of Jeju residents while incorporating them with my interpretation of *Chojip*, creativity, and philosophical belief. My primary challenge was how to balance the traditional characteristics of *Chojip* and modern aspects of Jeju House while harmonizing the building with the surrounding environment. The choice of building materials was another challenge as some of the traditional materials, such as thatch, were rather inconvenient to use. The final design of Jeju House is a result of my architectural interpretation of *Chojip* and understanding of Jeju people, society and nature. I believe that local identity cannot be achieved with architect's sole effort and talent, but also with the local residents' attention and voice. My personal experience living on Jeju Island and meeting local people while listening to their opinions have affected greatly on my design.

The follow-up study on installing the smart house concept with the use of renewable energy on Jeju House may increase future young residents' interest and suggest a cost-effective way of using home energy.

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APPENDIX A: SURVEY QUESTIONS

Jeju People's Attitudes Towards Jeju traditional houses (Chojip) and Modern houses

Purpose: The purpose of this survey is to study Jeju people's attitudes towards Jeju traditional houses, Chojip, thatched-roof houses and modern houses.

Instructions:

1. Please read each question carefully and check (V) the ones that describe your thoughts best.
2. Before go on to the next page please look at the following pictures of two different types of houses and think about them briefly.



Jeju traditional house, Chojip



Jeju modern house

[Demographic Information]

1. Gender: ☐ Male ☐ Female
2. Age: ☐ 20-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ 60-69 ☐ 70-79 ☐ 80-89
3. Occupation: _____
4. Place of living: _____
5. Last Education: ☐ Primary School ☐ Junior High School ☐ High School ☐ College
6. Have you ever lived in a traditional thatched-roof house, chojip?
- ☐ Yes (When? _____) ☐ No

[Traditional Houses: Chojip, Thatched-roof houses]

7. Chojip is practical.
- ☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree
8. Chojip is beautiful.
- ☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree
9. Chojip is environmentally friendly.
- ☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree
10. Chojip represents Jeju culture and history.
- ☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree
11. Chojip should be preserved.
- ☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree
12. I want to live in a chojip.
- ☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

13. If Chojip were modernized, I may live there.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

14. Choose spaces, features and materials of chojip that should be preserved. (Choose all).

Interior Space	Structure	Exterior Space	Materials
<input type="checkbox"/> <i>Jeongji</i> (Kitchen)	<input type="checkbox"/> <i>Cheonjeong</i>	<input type="checkbox"/> <i>Uyeong</i>	<input type="checkbox"/> <i>Hyeonmuam</i>
<input type="checkbox"/> <i>Chaesbang</i>	(Ceiling)	(Vegetable Garden)	(Volcanic Stone)
(Dining Room)	<input type="checkbox"/> <i>Jibung</i> (Roof)	<input type="checkbox"/> <i>Olleh</i> (a narrow	<input type="checkbox"/> <i>Sae</i> (Thatch)
<input type="checkbox"/> <i>Gudeul</i>	<input type="checkbox"/> <i>Oebyeok</i>	path to the house)	<input type="checkbox"/> <i>Namu</i> (Wood)
(Bedroom)	(External Walls)	<input type="checkbox"/> <i>Tongsi</i> (Toilet)	<input type="checkbox"/> <i>Heulk</i> (Soil)
<input type="checkbox"/> <i>Sangbang</i> (Living	<input type="checkbox"/> <i>Jeongnang</i> (Gate)	<input type="checkbox"/> <i>Madang</i> (Yard)	<input type="checkbox"/> <i>Jongi</i> (Paper)
Room)	<input type="checkbox"/> <i>Mun, Changmun</i>		
<input type="checkbox"/> <i>Nangan</i> (Patios	(Doors and		
and Decks)	Windows		
<input type="checkbox"/> <i>Gopang</i>	Floor)		
(Storeroom)	<input type="checkbox"/> <i>Pungchae</i> (Blind)		
<input type="checkbox"/> <i>Gulmuk</i> (Heating	<input type="checkbox"/> <i>Doldam</i> (Stone		
Space)	Fence)		

☐ None

15. Choose spaces, features and materials of chojip that should be adopted to modern houses (Choose all).

Interior Space	Structure	Exterior Space	Materials
<input type="checkbox"/> <i>Jeongji</i> (Kitchen)	<input type="checkbox"/> <i>Cheonjeong</i>	<input type="checkbox"/> <i>Uyeong</i>	<input type="checkbox"/> <i>Hyeonmuam</i>
<input type="checkbox"/> <i>Chaesbang</i>	(Ceiling)	(Vegetable Garden)	(Volcanic Stone)
(Dining Room)	<input type="checkbox"/> <i>Jibung</i> (Roof)	<input type="checkbox"/> <i>Olleh</i> (a narrow	<input type="checkbox"/> <i>Sae</i> (Thatch)
<input type="checkbox"/> <i>Gudeul</i>	<input type="checkbox"/> <i>Oebyeok</i>	path to the house)	<input type="checkbox"/> <i>Namu</i> (Wood)
(Bedroom)	(External Walls)	<input type="checkbox"/> <i>Tongsi</i> (Toilet)	<input type="checkbox"/> <i>Heulk</i> (Soil)
<input type="checkbox"/> <i>Sangbang</i> (Living	<input type="checkbox"/> <i>Jeongnang</i> (Gate)	<input type="checkbox"/> <i>Madang</i> (Yard)	<input type="checkbox"/> <i>Jongi</i> (Paper)
Room)	<input type="checkbox"/> <i>Mun, Changmun</i>		
<input type="checkbox"/> <i>Nangan</i> (Patios	(Doors and		
and Decks)	Windows		
<input type="checkbox"/> <i>Gopang</i>	Floor)		
(Storeroom)	<input type="checkbox"/> <i>Pungchae</i> (Blind)		
<input type="checkbox"/> <i>Gulmuk</i> (Heating	<input type="checkbox"/> <i>Doldam</i> (Stone		
Space)	Fence)		

☐ None

[Modern Houses]

16. Jeju Modern houses are practical.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

17. Jeju Modern houses are beautiful.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

18. Jeju Modern houses are environmentally friendly.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

19. Jeju Modern houses represent Jeju culture and history.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

20. Jeju Modern houses are distinctively different from other regions.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

21. Jeju Modern houses should be promoted continually.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

22. Modern houses should be more westernized.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

23. Modern houses should adopt spaces, features and materials of a thatched-roof house to some degree.

☐ Strongly Agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly Disagree

24. In order to improve chojip, what do you think needs to be considered?

e.g. Toilets should be built indoors.

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